

PRUEBA DE HABILIDADES - DIPLOMADO DE PROFUNDIZACIÓN CISCO
(DISEÑO E IMPLEMENTACIÓN DE SOLUCIONES INTEGRADAS LAN / WAN)

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UNIVERSIDAD NACIONAL ABIERTA Y A DISTANCIA UNAD
PROGRA INGENIERIA DE SISTEMAS
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SOLUCIONES INTEGRADAS LAN/WAN)
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TRABAJO DE DIPLOMADO PARA OPTAR POR EL TÍTULO DE INGENIERO DE
SISTEMAS

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Jurado

Jurado

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1 INTRODUCCIÓN

En la actualidad las redes de datos son parte fundamental de todas las tecnologías que cada día crece más con el fin de suplir y mejorar las necesidades de las personas, permitiendo como objetivo principal la comunicación en diferentes medios, como archivos, voz, audio, video entre muchos más.

Durante todo el trascurso del diplomado de cisco, se abordaron 4 unidades en las cuales se adquirieron los conocimientos necesarios de configuración, e implementación de redes de datos, tanto para pequeñas empresas como para grandes con varias sedes.

En el presente trabajo se abordarán algunos de los aspectos aprendidos durante todo el diplomado, con el fin de aplicar protocolos y demás configuraciones para dos escenarios que consisten en conectar y configurar dos o más redes en diferentes ciudades o sedes.

2 PLANTEAMIENTO DEL PROBLEMA

DEFINICIÓN DEL PROBLEMA

3 Escenario 1

Una empresa posee sucursales distribuidas en las ciudades de Bogotá y Medellín, en donde el estudiante será el administrador de la red, el cual deberá configurar e interconectar entre sí cada uno de los dispositivos que forman parte del escenario, acorde con los lineamientos establecidos para el direccionamiento IP, protocolos de enrutamiento y demás aspectos que forman parte de la topología de red.

Topología de red

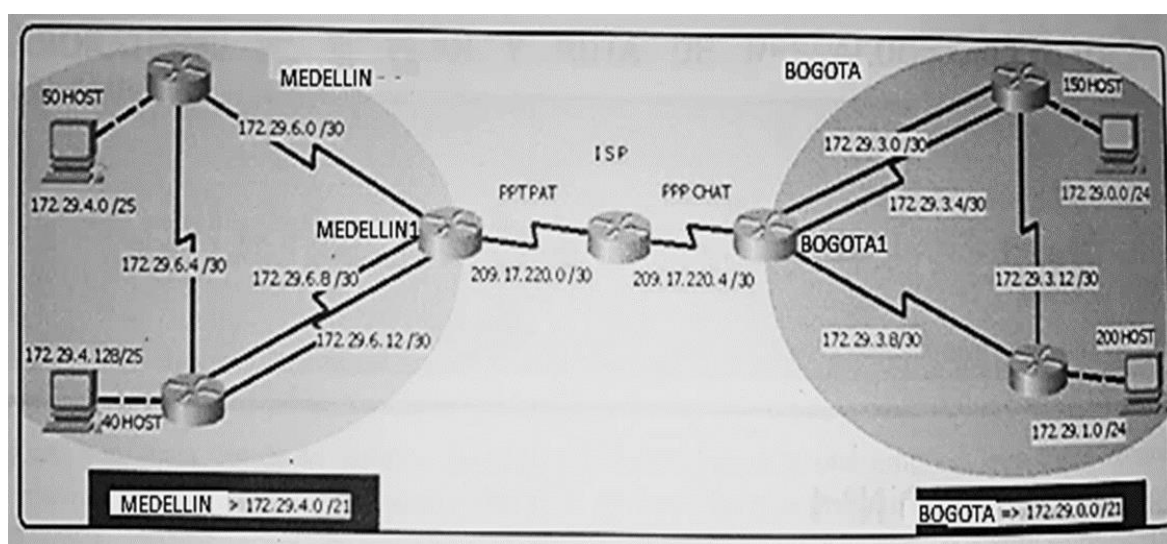


Ilustración 1: Topología de red 1

Este escenario plantea el uso de RIP como protocolo de enrutamiento, considerando que se tendrán rutas por defecto redistribuidas; asimismo, habilitar el encapsulamiento PPP y su autenticación.

Los routers Bogota2 y medellin2 proporcionan el servicio DHCP a su propia red LAN y a los routers 3 de cada ciudad.

Debe configurar PPP en los enlaces hacia el ISP, con autenticación.

Debe habilitar NAT de sobrecarga en los routers Bogota1 y medellin1.

DESARROLLO DEL PROYECTO

Como trabajo inicial se debe realizar lo siguiente.

- Realizar las rutinas de diagnóstico y dejar los equipos listos para su configuración (asignar nombres de equipos, asignar claves de seguridad, etc).
- Se realizan las configuraciones básicas de seguridad en cada uno de los dispositivos, agregándoles una contraseña y un nombre para identificarlos.

Configuración Router MEDELLIN2

```
MEDELLIN2(config)#hostname MEDELLIN2
MEDELLIN2(config)#no ip domain-lookup
MEDELLIN2(config)#service password-encryption
MEDELLIN2(config)#enable secret class
MEDELLIN2(config)#line console 0
MEDELLIN2(config-line)#password cisco
MEDELLIN2(config-line)#login
MEDELLIN2(config-line)#LINE VTY 0 15
MEDELLIN2(config-line)#password cisco
MEDELLIN2(config-line)#login
```

Configuración Router MEDELLIN3

```
MEDELLIN3(config)#hostname MEDELLIN3
MEDELLIN3(config)#no ip domain-lookup
MEDELLIN3(config)#service password-encryption
MEDELLIN3(config)#enable secret class
MEDELLIN3(config)#line console 0
MEDELLIN3(config-line)#password cisco
```

```
MEDELLIN3(config-line)#login
MEDELLIN3(config-line)#LINE VTY 0 15
MEDELLIN3(config-line)#password cisco
MEDELLIN3(config-line)#login
```

Configuración Router ISP

```
ISP(config)#no ip domain-lookup
ISP(config)#service password-encryption
ISP(config)#enable secret class
ISP(config)#line console 0
ISP(config-line)#password cisco
ISP(config-line)#login
ISP(config-line)#LINE VTY 0 15
ISP(config-line)#password cisco
ISP(config-line)#login
```

Configuración Router MEDELLIN1

```
MEDELLIN>ENABLE
MEDELLIN#CONF T
Enter configuration commands, one per line. End with CNTL/Z.
MEDELLIN(config)#hostname MEDELLIN1
MEDELLIN1(config)#no ip domain-lookup
MEDELLIN1(config)#service password-encryption
MEDELLIN1(config)#enable secret class
MEDELLIN1(config)#line console 0
MEDELLIN1(config-line)#password cisco
MEDELLIN1(config-line)#login
MEDELLIN1(config-line)#LINE VTY 0 15
MEDELLIN1(config-line)#password cisco
```

MEDELLIN1(config-line)#login

Configuración Router BOGOTÁ

BOGOTA>ENABLE

BOGOTA#conf t

Enter configuration commands, one per line. End with CNTL/Z.

BOGOTA(config)#no ip domain-lookup

BOGOTA(config)#service password-encryption

BOGOTA(config)#enable secret class

BOGOTA(config)#line console 0

BOGOTA(config-line)#password cisco

BOGOTA(config-line)#login

BOGOTA(config-line)#LINE VTY 0 15

BOGOTA(config-line)#password cisco

BOGOTA(config-line)#login

Configuración Router BOGOTÁ 2

Router>enable

Router#conf t

Enter configuration commands, one per line. End with CNTL/Z.

Router(config)#hostname BOGOTA2

BOGOTA2(config)#no ip domain-lookup

BOGOTA2(config)#service password-encryption

BOGOTA2(config)#enable secret class

BOGOTA2(config)#line console 0

BOGOTA2(config-line)#password cisco

BOGOTA2(config-line)#login

BOGOTA2(config-line)#LINE VTY 0 15

BOGOTA2(config-line)#password cisco

BOGOTA2(config-line)#login

Configuración Router BOGOTÁ 3

Router>enable

Router#conf t

Enter configuration commands, one per line. End with CNTL/Z.

Router(config)#hostname BOGOTA3

BOGOTA3(config)#no ip domain-lookup

BOGOTA3(config)#service password-encryption

BOGOTA3(config)#enable secret class

BOGOTA3(config)#line console 0

BOGOTA3(config-line)#password cisco

BOGOTA3(config-line)#login

BOGOTA3(config-line)#LINE VTY 0 15

BOGOTA3(config-line)#password cisco

BOGOTA3(config-line)#login

Realizar la conexión física de los equipos con base en la topología de red

Configurar la topología de red, de acuerdo con las siguientes especificaciones.

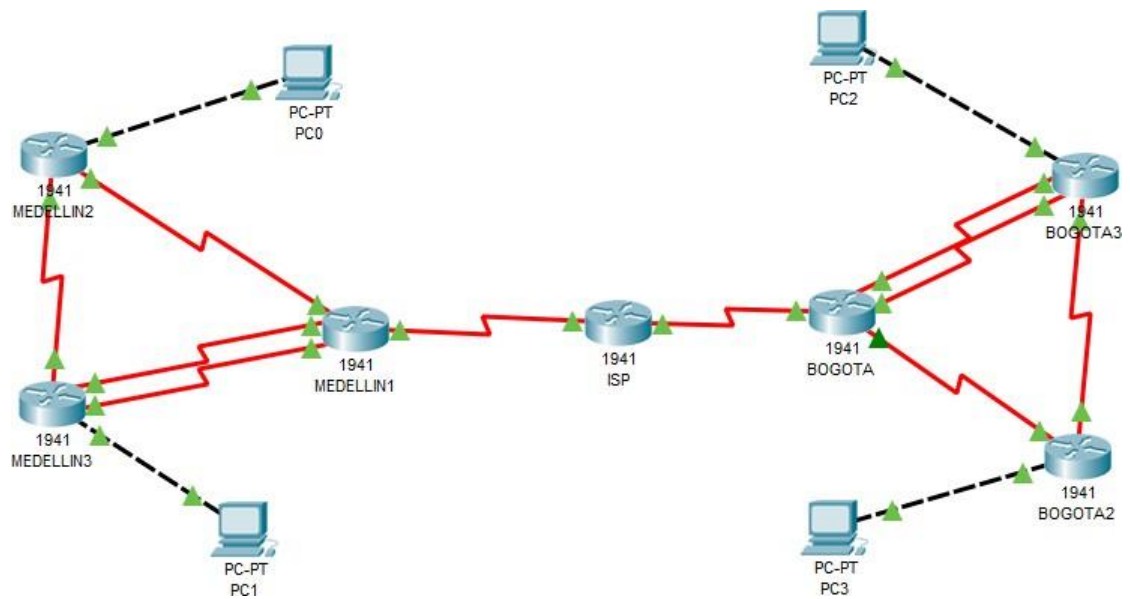


Ilustración 2: Topología

Parte 1: Configuración del enrutamiento

a. Configurar el enrutamiento en la red usando el protocolo RIP versión 2, declare la red principal, desactive la sumarización automática.

Se realiza la configuración de enrutamiento para cada uno de los dispositivos, según la topología establecida.

Configuración Router ISP

```
Router>ENABLE
```

```
Router#conf t
```

Enter configuration commands, one per line. End with CNTL/Z.

```
Router(config)#int s0/0/0
```

```
Router(config-if)#ip address 209.17.220.1 255.255.255.252
```

```
Router(config-if)#clock rate 4000000
```

```
Router(config-if)#no shut
```

%LINK-5-CHANGED: Interface Serial0/0/0, changed state to down

```
Router(config-if)#int s0/0/1
```

```
Router(config-if)#ip address 209.17.220.5 255.255.255.252
```

```
Router(config-if)#clock rate 4000000
Router(config-if)#no shut
%LINK-5-CHANGED: Interface Serial0/0/1, changed state to down
```

Configuración ROUTER_MEDELLIN1

```
Router>ENABLE
Router#CONF T
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#int s0/0/0
Router(config-if)#ip address 209.17.220.2 255.255.255.252
Router(config-if)#no shut
Router(config-if)#
%LINK-5-CHANGED: Interface Serial0/0/0, changed state to up
Router(config-if)#
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/0/0, changed state
to up
Router(config-if)#int s0/0/1
Router(config-if)#ip address 172.29.6.1 255.255.255.252
Router(config-if)#clock rate 4000000
Router(config-if)#no shut
%LINK-5-CHANGED: Interface Serial0/0/1, changed state to down
Router(config-if)#int s0/1/0
Router(config-if)#ip address 172.29.6.9 255.255.255.252
Router(config-if)#clock rate 4000000
Router(config-if)#no shut
%LINK-5-CHANGED: Interface Serial0/1/0, changed state to down
Router(config-if)#int s0/1/1
Router(config-if)#ip address 172.29.6.13 255.255.255.252
Router(config-if)#clock rate 4000000
Router(config-if)#no shut
%LINK-5-CHANGED: Interface Serial0/1/1, changed state to down
```

Router(config-if)#

Configuración ROUTER_MEDELLIN2

Router>enable

Router#conf t

Enter configuration commands, one per line. End with CNTL/Z.

Router(config)#int s0/0/0

Router(config-if)#ip address 172.29.6.2 255.255.255.252

Router(config-if)#no shut

Router(config-if)#

%LINK-5-CHANGED: Interface Serial0/0/0, changed state to up

Router(config-if)#

%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/0/0, changed state to up

Router(config-if)#int s0/0/1

Router(config-if)#ip address 172.29.6.5 255.255.255.252

Router(config-if)#clock rate 4000000

Router(config-if)#no shut

%LINK-5-CHANGED: Interface Serial0/0/1, changed state to down

Router(config-if)#int g0/0

Router(config-if)#ip address 172.29.4.1 255.255.255.128

Router(config-if)#no shut

Router(config-if)#

%LINK-5-CHANGED: Interface GigabitEthernet0/0, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/0, changed state to up

Configuración ROUTER_MEDELLIN3

Router>enable

Router#conf t

Enter configuration commands, one per line. End with CNTL/Z.

Router(config)#

Router(config)#int s0/0/0

Router(config-if)#ip address 172.29.6.10 255.255.255.252

Router(config-if)#no shut

Router(config-if)#

%LINK-5-CHANGED: Interface Serial0/0/0, changed state to up

Router(config-if)#int s0/0/1

%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/0/0, changed st

Router(config-if)#int s0/0/1

Router(config-if)#ip address 172.29.6.14 255.255.255.252

Router(config-if)#no shut

Router(config-if)#

%LINK-5-CHANGED: Interface Serial0/0/1, changed state to up

Router(config-if)#

%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/0/1, changed state to up

Router(config-if)#int s0/1/0

Router(config-if)#ip address 172.29.6.6 255.255.255.252

Router(config-if)#no shut

Router(config-if)#

%LINK-5-CHANGED: Interface Serial0/1/0, changed state to up

Router(config-if)#

%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/1/0, changed state to up

Router(config-if)#int g0/0

Router(config-if)#ip address 172.29.4.129 255.255.255.128

Router(config-if)#no shut

Router(config-if)#

%LINK-5-CHANGED: Interface GigabitEthernet0/0, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/0, changed state to up

Router(config-if)#

Configuración BOGOTA1

Router>enable

Router#conf t

Enter configuration commands, one per line. End with CNTL/Z.

Router(config)#int s0/0/0

Router(config-if)#ip address 209.17.220.6 255.255.255.252

Router(config-if)#no shut

Router(config-if)#

%LINK-5-CHANGED: Interface Serial0/0/0, changed state to up

Router(config-if)#

%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/0/0, changed state to up

Router(config-if)#int s0/0/1

Router(config-if)#ip address 172.29.3.9 255.255.255.252

Router(config-if)#clock rate 4000000

Router(config-if)#no shut

%LINK-5-CHANGED: Interface Serial0/0/1, changed state to down

Router(config-if)#int s0/1/0

Router(config-if)#ip address 172.29.3.1 255.255.255.252

Router(config-if)#clock rate 4000000

Router(config-if)#no shut

%LINK-5-CHANGED: Interface Serial0/1/0, changed state to down

Router(config-if)#int s0/1/1

Router(config-if)#ip address 172.29.3.5 255.255.255.252

Router(config-if)#clock rate 4000000

Router(config-if)#no shut

%LINK-5-CHANGED: Interface Serial0/1/1, changed state to down

```
Router(config-if)#
```

Configuración BOGOTA2

```
Router(config-if)#int g0/0
```

```
Router(config-if)#ip address 172.29.1.1 255.255.255.0
```

```
Router(config-if)#no shut
```

```
Router(config-if)#
```

```
%LINK-5-CHANGED: Interface GigabitEthernet0/0, changed state to up
```

```
%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/0,  
changed state to up
```

```
Router(config-if)#int s0/0/0
```

```
Router(config-if)#ip address 172.29.3.10 255.255.255.252
```

```
Router(config-if)#no shut
```

```
Router(config-if)#int s0/0/1
```

```
Router(config-if)#ip address 172.29.3.13 255.255.255.252
```

```
Router(config-if)#clock rate 4000000
```

```
Router(config-if)#no shut
```

```
Router(config-if)#
```

Configuración BOGOTA3

```
Router>enable
```

```
Router#conf t
```

```
Enter configuration commands, one per line. End with CNTL/Z.
```

```
Router(config)#int s0/0/0
```

```
Router(config-if)#ip address 172.29.3.2 255.255.255.252
```

```
Router(config-if)#no shut
```

```
Router(config-if)#
```

```
%LINK-5-CHANGED: Interface Serial0/0/0, changed state to up
```

```
Router(config-if)#int
```

```

%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/0/0, changed state
to up
Router(config-if)#int s0/0/1
Router(config-if)#ip address 172.29.3.6 255.255.255.252
Router(config-if)#no shut
Router(config-if)#
%LINK-5-CHANGED: Interface Serial0/0/1, changed state to up
Router(config-if)#int g0/0
Router(config-if)#ip address 172.29.3.6 255.255.255.252
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/0/1, changed state
to up
% 172.29.3.4 overlaps with Serial0/0/1
Router(config-if)#int g0/0
Router(config-if)#ip address 172.29.0.1 255.255.255.0
Router(config-if)#no shut
Router(config-if)#
%LINK-5-CHANGED: Interface GigabitEthernet0/0, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/0,
changed state to up
Router(config-if)#

```

Configuración MEDELLIN1

```

Router>ENABLE
Router#conf t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#router rip
Router(config-router)#version 2
Router(config-router)#no auto-summary
Router(config-router)#do show ip route connected
C 172.29.6.0/30 is directly connected, Serial0/0/1
C 172.29.6.8/30 is directly connected, Serial0/1/0
C 172.29.6.12/30 is directly connected, Serial0/1/1
C 209.17.220.0/30 is directly connected, Serial0/0/0
Router(config-router)#network 172.29.6.0

```

```
Router(config-router)#network 172.29.6.8
Router(config-router)#network 172.29.6.12
Router(config-router)#passive-interface s0/0/0
Router(config-router)#
```

Configuración MEDELLIN2

```
Router>enable
Router#conf t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#router rip
Router(config-router)#version 2
Router(config-router)#no auto-summary
Router(config-router)#do show ip route connected
C 172.29.4.0/25 is directly connected, GigabitEthernet0/0
C 172.29.6.0/30 is directly connected, Serial0/0/0
C 172.29.6.4/30 is directly connected, Serial0/0/1
Router(config-router)#network 172.29.4.0
Router(config-router)#network 172.29.6.0
Router(config-router)#network 172.29.6.4
Router(config-router)#passive-interface g0/0
Router(config-router)#
```

Configuración MEDELLIN3

```
Router>enable
Router#conf t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#router rip
Router(config-router)#version 2
Router(config-router)#no auto-summary
```

```
Router(config-router)#do show ip route connected
C 172.29.4.128/25 is directly connected, GigabitEthernet0/0
C 172.29.6.4/30 is directly connected, Serial0/1/0
C 172.29.6.8/30 is directly connected, Serial0/0/0
C 172.29.6.12/30 is directly connected, Serial0/0/1
Router(config-router)#network 172.29.4.128
Router(config-router)#network 172.29.6.4
Router(config-router)#network 172.29.6.8
Router(config-router)#network 172.29.6.12
Router(config-router)#passive-interface g0/0
Router(config-router)#
```

Configuración BOGOTA1

```
Router>
Router>ENABLE
Router#conf t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#router rip
Router(config-router)#version 2
Router(config-router)#no auto-summary
Router(config-router)#do show ip route connected
C 172.29.3.0/30 is directly connected, Serial0/1/0
C 172.29.3.4/30 is directly connected, Serial0/1/1
C 172.29.3.8/30 is directly connected, Serial0/0/1
C 209.17.220.4/30 is directly connected, Serial0/0/0
Router(config-router)#network 172.29.3.0
Router(config-router)#network 172.29.3.4
Router(config-router)#network 172.29.3.8
Router(config-router)#passive-interface s0/0/0
Router(config-router)#
```

Configuración BOGOTA2

```
Router(config-router)#
Router(config-router)#
Router(config-router)#do show ip route connected
C 172.29.1.0/24 is directly connected, GigabitEthernet0/0
C 172.29.3.8/30 is directly connected, Serial0/0/0
C 172.29.3.12/30 is directly connected, Serial0/0/1
Router(config-router)#exit
Router(config)#router rip
Router(config-router)#version 2
Router(config-router)#no auto-summary
Router(config-router)#do show ip route connected
C 172.29.1.0/24 is directly connected, GigabitEthernet0/0
C 172.29.3.8/30 is directly connected, Serial0/0/0
C 172.29.3.12/30 is directly connected, Serial0/0/1
Router(config-router)#network 172.29.1.0
Router(config-router)#network 172.29.3.8
Router(config-router)#network 172.29.3.12
Router(config-router)#passive-interface g0/0
Router(config-router)#
```

Configuración BOGOTA3

```
Router#conf t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#router rip
Router(config-router)#version 2
Router(config-router)#no auto-summary
Router(config-router)#do show ip route connected
```

```

C 172.29.0.0/24 is directly connected, GigabitEthernet0/0
C 172.29.3.0/30 is directly connected, Serial0/0/0
C 172.29.3.4/30 is directly connected, Serial0/0/1
C 172.29.3.12/30 is directly connected, Serial0/1/0
Router(config-router)#network 172.29.0.0
Router(config-router)#network 172.29.3.0
Router(config-router)#network 172.29.3.4
Router(config-router)#passive-interface g0/0
Router(config-router)#

```

b. Los routers Bogota1 y Medellín deberán añadir a su configuración de enrutamiento una ruta por defecto hacia el ISP y, a su vez, redistribuirla dentro de las publicaciones de RIP.

Se configura el enrutamiento hacia el ISP, dejando una ruta por defecto, adicional a eso con el comando **default-information originate** se distribuye dentro las publicaciones de RIP.

Configuración ROUTER MEDELLIN1

```

Router>enable
Router#conf t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#ip route 0.0.0.0 0.0.0.0 209.17.220.1
Router(config)#router rip
Router(config-router)#default-information originate
Router(config-router)#

```

Configuración ROUTER BOGOTA1

```

Router>enable
Router#conf t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#ip route 0.0.0.0 0.0.0.0 209.17.220.5
Router(config)#route rip

```



```
Router(config-router)#default-information origina
Router(config-router)#
```

- c. El router ISP deberá tener una ruta estática dirigida hacia cada red interna de Bogotá y Medellín para el caso se sumarian las subredes de cada uno a /22.

```
Router>enable
Router#conf t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#ip route 172.29.4.0 255.255.252.0 209.17.220.2
Router(config)#ip route 172.29.0.0 255.255.252.0 209.17.220.6
Router(config)#
```

Parte 2: Tabla de Enrutamiento.

- a. Verificar la tabla de enrutamiento en cada uno de los routers para comprobar las redes y sus rutas.

Mediante el comando **Show Ip route** se verifica las tablas de entiramiento para cada uno de los dispositivos.

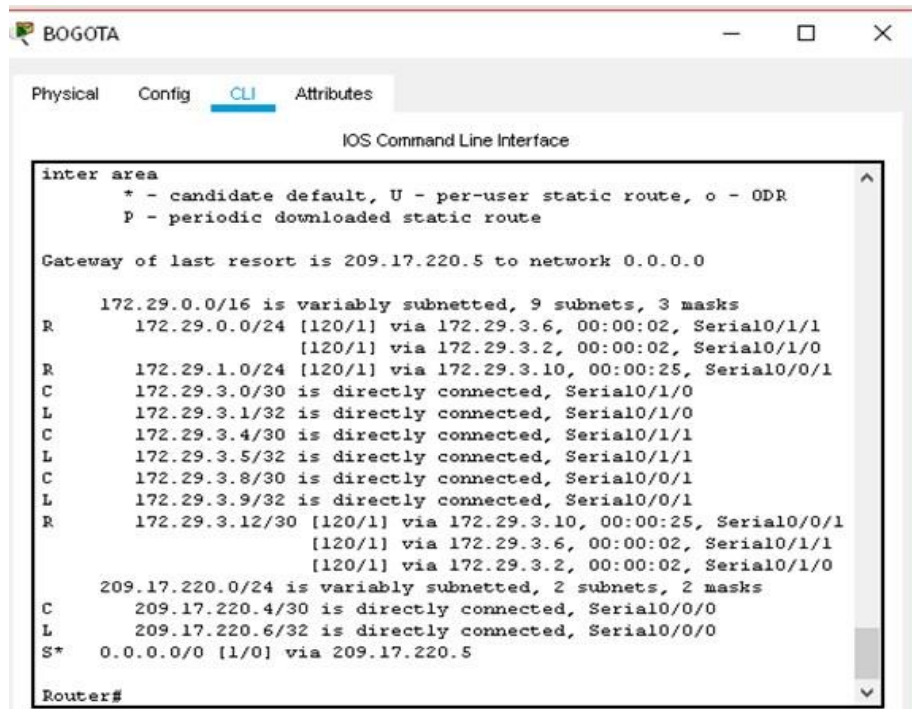


Ilustración 3: Enrutamiento Router Bogota

```
P - periodic downloaded static route
Gateway of last resort is 209.17.220.1 to network 0.0.0.0

  172.29.0.0/16 is variably subnetted, 9 subnets, 3 masks
R    172.29.4.0/25 [120/1] via 172.29.6.2, 00:00:24, Serial0/0/1
R    172.29.4.128/25 [120/1] via 172.29.6.14, 00:00:18,
Serial0/1/1
                                   [120/1] via 172.29.6.10, 00:00:18,
Serial0/1/0
C    172.29.6.0/30 is directly connected, Serial0/0/1
L    172.29.6.1/32 is directly connected, Serial0/0/1
R    172.29.6.4/30 [120/1] via 172.29.6.2, 00:00:24, Serial0/0/1
                                   [120/1] via 172.29.6.14, 00:00:18, Serial0/1/1
                                   [120/1] via 172.29.6.10, 00:00:18, Serial0/1/0
C    172.29.6.8/30 is directly connected, Serial0/1/0
L    172.29.6.9/32 is directly connected, Serial0/1/0
C    172.29.6.12/30 is directly connected, Serial0/1/1
L    172.29.6.13/32 is directly connected, Serial0/1/1
209.17.220.0/24 is variably subnetted, 2 subnets, 2 masks
C    209.17.220.0/30 is directly connected, Serial0/0/0
L    209.17.220.2/32 is directly connected, Serial0/0/0
S*  0.0.0.0/0 [1/0] via 209.17.220.1

Router#
```

Ilustración 4: Enrutamiento Router Medellin1

b. Verificar el balanceo de carga que presentan los routers.

```
i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, ia - IS-IS
inter area
* - candidate default, U - per-user static route, o - ODR
P - periodic downloaded static route
Gateway of last resort is 172.29.3.1 to network 0.0.0.0

  172.29.0.0/16 is variably subnetted, 10 subnets, 3 masks
C    172.29.0.0/24 is directly connected, GigabitEthernet0/0
L    172.29.0.1/32 is directly connected, GigabitEthernet0/0
R    172.29.1.0/24 [120/1] via 172.29.3.13, 00:00:03, Serial0/1/0
C    172.29.3.0/30 is directly connected, Serial0/0/0
L    172.29.3.2/32 is directly connected, Serial0/0/0
C    172.29.3.4/30 is directly connected, Serial0/0/1
L    172.29.3.6/32 is directly connected, Serial0/0/1
R    172.29.3.8/30 [120/1] via 172.29.3.13, 00:00:03, Serial0/1/0
                                   [120/1] via 172.29.3.1, 00:00:07, Serial0/0/0
                                   [120/1] via 172.29.3.5, 00:00:07, Serial0/0/1
C    172.29.3.12/30 is directly connected, Serial0/1/0
L    172.29.3.14/32 is directly connected, Serial0/1/0
R*  0.0.0.0/0 [120/1] via 172.29.3.1, 00:00:07, Serial0/0/0
                                   [120/1] via 172.29.3.5, 00:00:07, Serial0/0/1

Router#
Router#
```

Ilustración 5: Balanceo de Carga Router 3

```
MEDELLIN3
Physical Config CLI Attributes
IOS Command Line Interface
* - candidate default, U - per-user static route, o - ODR
P - periodic downloaded static route
Gateway of last resort is 172.29.6.13 to network 0.0.0.0
172.29.0.0/16 is variably subnetted, 10 subnets, 3 masks
R 172.29.4.0/25 [120/1] via 172.29.6.5, 00:00:12, Serial0/1/0
C 172.29.4.128/25 is directly connected, GigabitEthernet0/0
L 172.29.4.129/32 is directly connected, GigabitEthernet0/0
R 172.29.6.0/30 [120/1] via 172.29.6.13, 00:00:02, Serial0/0/1
[120/1] via 172.29.6.5, 00:00:12, Serial0/1/0
[120/1] via 172.29.6.9, 00:00:02, Serial0/0/0
C 172.29.6.4/30 is directly connected, Serial0/1/0
L 172.29.6.6/32 is directly connected, Serial0/1/0
C 172.29.6.8/30 is directly connected, Serial0/0/0
L 172.29.6.10/32 is directly connected, Serial0/0/0
C 172.29.6.12/30 is directly connected, Serial0/0/1
L 172.29.6.14/32 is directly connected, Serial0/0/1
R* 0.0.0.0/0 [120/1] via 172.29.6.13, 00:00:02, Serial0/0/1
[120/1] via 172.29.6.9, 00:00:02, Serial0/0/0
Router#
Router#
Router#
Router#
```

Ilustración 6: Balanceo de Carga MEDELLIN3

- c. Obsérvese en los routers Bogotá1 y Medellín1 cierta similitud por su ubicación, por tener dos enlaces de conexión hacia otro router y por la ruta por defecto que manejan.
- d. Los routers Medellín2 y Bogotá2 también presentan redes conectadas directamente y recibidas mediante RIP.
- e. Las tablas de los routers restantes deben permitir visualizar rutas redundantes para el caso de la ruta por defecto.
- f. El router ISP solo debe indicar sus rutas estáticas adicionales a las directamente conectadas.

El Router ISP, solo muestra sus dos rutas conectadas directamente, mediante el comando show ip route

```

ISP
Physical Config CLI Attributes
IOS Command Line Interface

BGP
  D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
  N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
  E1 - OSPF external type 1, E2 - OSPF external type 2, E - EGP
  i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, ia - IS-IS
  inter area
  * - candidate default, U - per-user static route, o - ODR
  P - periodic downloaded static route

Gateway of last resort is not set

  172.29.0.0/24 is subnetted, 2 subnets
S   172.29.0.0/24 [1/0] via 209.17.220.6
S   172.29.4.0/24 [1/0] via 209.17.220.2
  209.17.220.0/24 is variably subnetted, 4 subnets, 2 masks
C   209.17.220.0/30 is directly connected, Serial0/0/0
L   209.17.220.1/32 is directly connected, Serial0/0/0
C   209.17.220.4/30 is directly connected, Serial0/0/1
L   209.17.220.5/32 is directly connected, Serial0/0/1

Router#
Router#
Router#
Router#
Router#

```

Ilustración 7: Punto c, d, e y f

Parte 3: Deshabilitar la propagación del protocolo RIP.

a. Para no propagar las publicaciones por interfaces que no lo requieran se debe deshabilitar la propagación del protocolo RIP, en la siguiente tabla se indican las interfaces de cada router que no necesitan desactivación.

ROUTER	INTERFAZ
Bogota1	SERIAL0/0/1; SERIAL0/1/0; SERIAL0/1/1
Bogota2	SERIAL0/0/0; SERIAL0/0/1
Bogota3	SERIAL0/0/0; SERIAL0/0/1; SERIAL0/1/0
Medellín1	SERIAL0/0/0; SERIAL0/0/1; SERIAL0/1/1

Medellín2	SERIAL0/0/0; SERIAL0/0/1
Medellín3	SERIAL0/0/0; SERIAL0/0/1; SERIAL0/1/0
ISP	No lo requiere

Esta configuración se realizó cuando se configuro RIP

Parte 4: Verificación del protocolo RIP.

a Verificar y documentar las opciones de enrutamiento configuradas en los routers, como el passive interface para la conexión hacia el ISP, la versión de RIP y las interfaces que participan de la publicación entre otros datos.

Se realiza verificación mediante el comando **show ip protocols**

Router MEDELLIN1



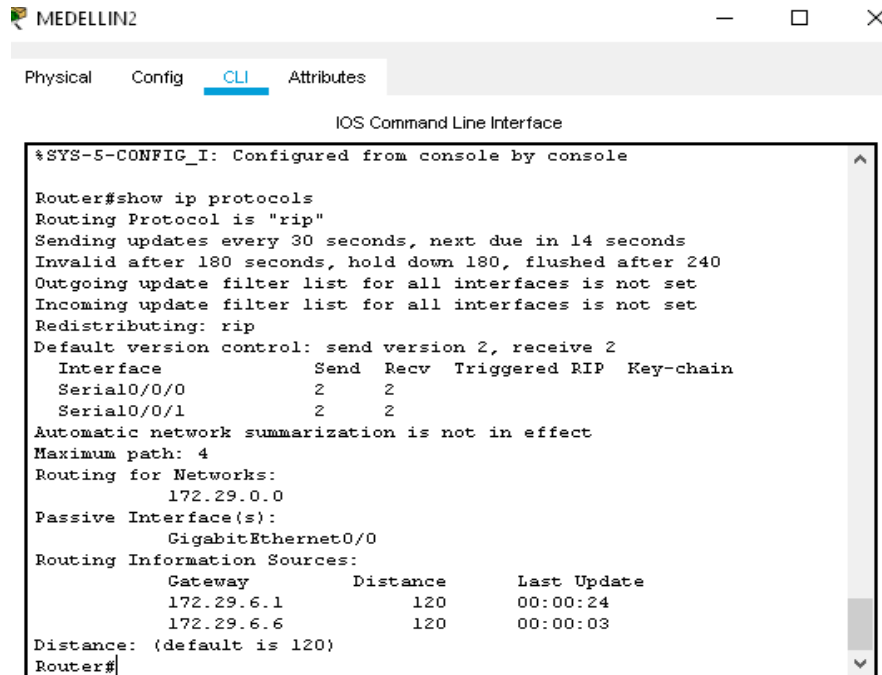
```

Router#
Router#show ip protocols
Routing Protocol is "rip"
Sending updates every 30 seconds, next due in 20 seconds
Invalid after 180 seconds, hold down 180, flushed after 240
Outgoing update filter list for all interfaces is not set
Incoming update filter list for all interfaces is not set
Redistributing: rip
Default version control: send version 2, receive 2
  Interface          Send  Recv  Triggered RIP  Key-chain
  Serial0/1/0         2     2
  Serial0/1/1         2     2
  Serial0/0/1         2     2
Automatic network summarization is not in effect
Maximum path: 4
Routing for Networks:
  172.29.0.0
Passive Interface(s):
  Serial0/0/0
Routing Information Sources:
  Gateway         Distance      Last Update
  172.29.6.2      120          00:00:24
  172.29.6.14     120          00:00:17
  172.29.6.10     120          00:00:17
--More--

```

Ilustración 8: Enrutamiento MEDELLIN1

Router MEDELLIN2



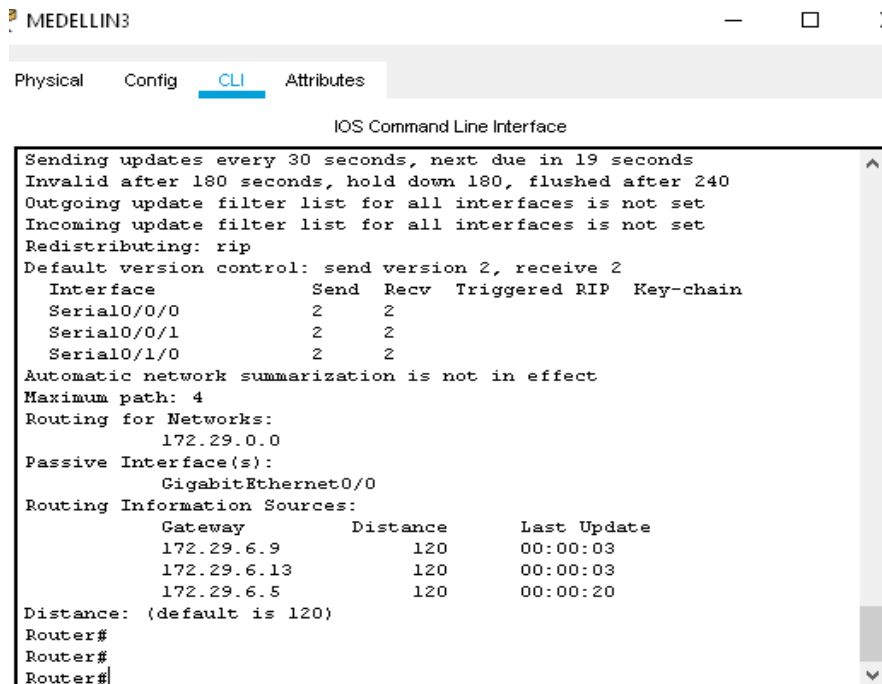
The screenshot shows the CLI of Router MEDELLIN2. The 'CLI' tab is selected. The command prompt is 'Router#'. The output of the 'show ip protocols' command is displayed, showing that RIP is configured with a 30-second update interval and a 180-second hold-down. The output also shows the interfaces Serial0/0/0 and Serial0/0/1, and the routing information sources 172.29.6.1 and 172.29.6.6.

```
%SYS-5-CONFIG_I: Configured from console by console

Router#show ip protocols
Routing Protocol is "rip"
Sending updates every 30 seconds, next due in 14 seconds
Invalid after 180 seconds, hold down 180, flushed after 240
Outgoing update filter list for all interfaces is not set
Incoming update filter list for all interfaces is not set
Redistributing: rip
Default version control: send version 2, receive 2
  Interface          Send  Recv  Triggered RIP  Key-chain
Serial0/0/0          2     2
Serial0/0/1          2     2
Automatic network summarization is not in effect
Maximum path: 4
Routing for Networks:
  172.29.0.0
Passive Interface(s):
  GigabitEthernet0/0
Routing Information Sources:
  Gateway            Distance    Last Update
  172.29.6.1         120         00:00:24
  172.29.6.6         120         00:00:03
Distance: (default is 120)
Router#
```

Ilustración 9: Enrutamiento MEDELLIN2

Router MEDELLIN3

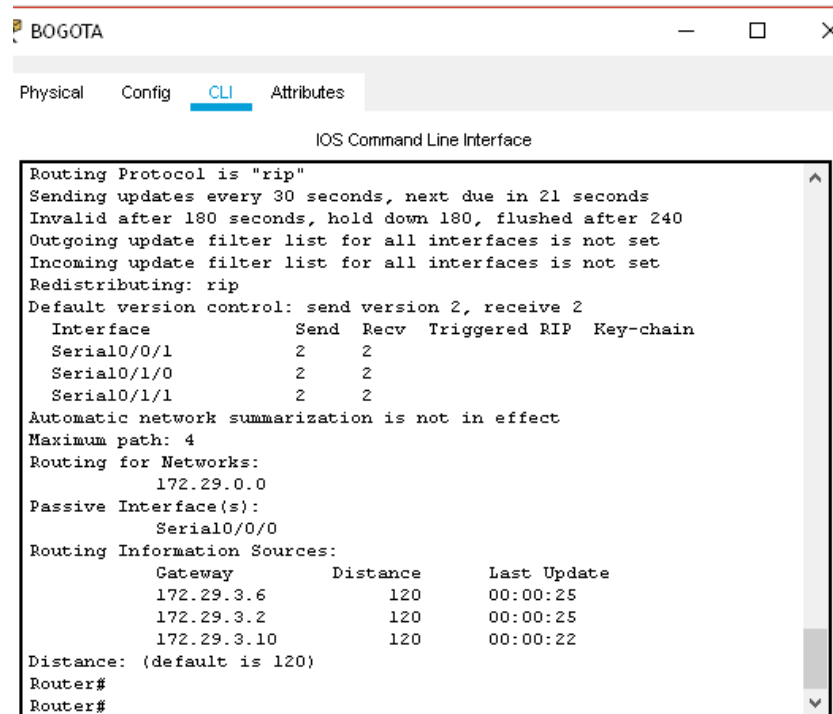


The screenshot shows the CLI of Router MEDELLIN3. The 'CLI' tab is selected. The command prompt is 'Router#'. The output of the 'show ip protocols' command is displayed, showing that RIP is configured with a 30-second update interval and a 180-second hold-down. The output also shows the interfaces Serial0/0/0, Serial0/0/1, and Serial0/1/0, and the routing information sources 172.29.6.9, 172.29.6.13, and 172.29.6.5.

```
Sending updates every 30 seconds, next due in 19 seconds
Invalid after 180 seconds, hold down 180, flushed after 240
Outgoing update filter list for all interfaces is not set
Incoming update filter list for all interfaces is not set
Redistributing: rip
Default version control: send version 2, receive 2
  Interface          Send  Recv  Triggered RIP  Key-chain
Serial0/0/0          2     2
Serial0/0/1          2     2
Serial0/1/0          2     2
Automatic network summarization is not in effect
Maximum path: 4
Routing for Networks:
  172.29.0.0
Passive Interface(s):
  GigabitEthernet0/0
Routing Information Sources:
  Gateway            Distance    Last Update
  172.29.6.9         120         00:00:03
  172.29.6.13        120         00:00:03
  172.29.6.5         120         00:00:20
Distance: (default is 120)
Router#
Router#
Router#
```

Ilustración 10: Enrutamiento Medellin3

Router BOGOTÁ



Physical Config **CLI** Attributes

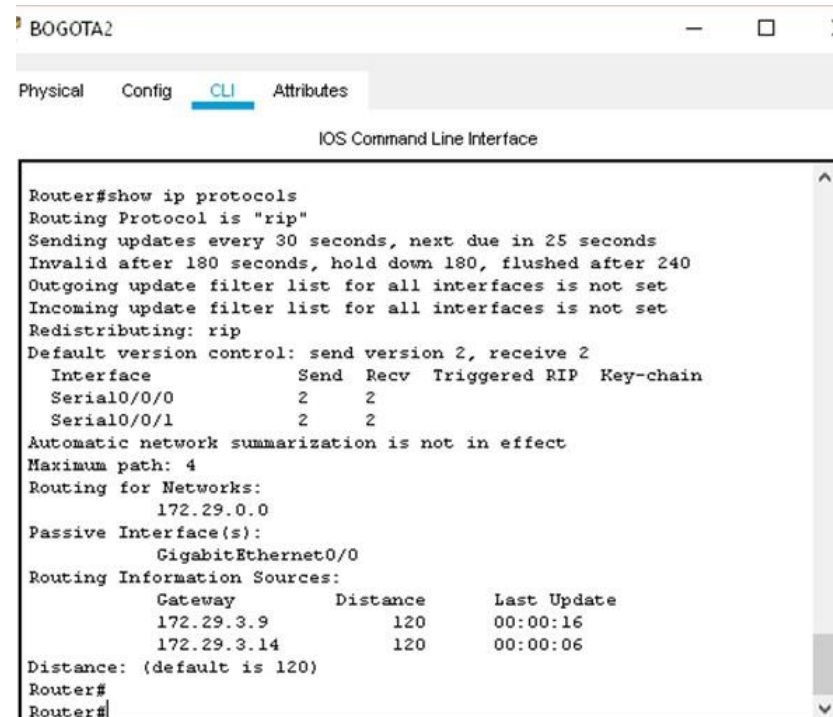
IOS Command Line Interface

```

Routing Protocol is "rip"
Sending updates every 30 seconds, next due in 21 seconds
Invalid after 180 seconds, hold down 180, flushed after 240
Outgoing update filter list for all interfaces is not set
Incoming update filter list for all interfaces is not set
Redistributing: rip
Default version control: send version 2, receive 2
  Interface          Send  Recv  Triggered RIP  Key-chain
  Serial0/0/1         2     2
  Serial0/1/0         2     2
  Serial0/1/1         2     2
Automatic network summarization is not in effect
Maximum path: 4
Routing for Networks:
  172.29.0.0
Passive Interface(s):
  Serial0/0/0
Routing Information Sources:
  Gateway         Distance      Last Update
  172.29.3.6       120           00:00:25
  172.29.3.2       120           00:00:25
  172.29.3.10      120           00:00:22
Distance: (default is 120)
Router#
Router#
  
```

Ilustración 11: Enrutamiento BOGOTÁ1

Router BOGOTÁ2



Physical Config **CLI** Attributes

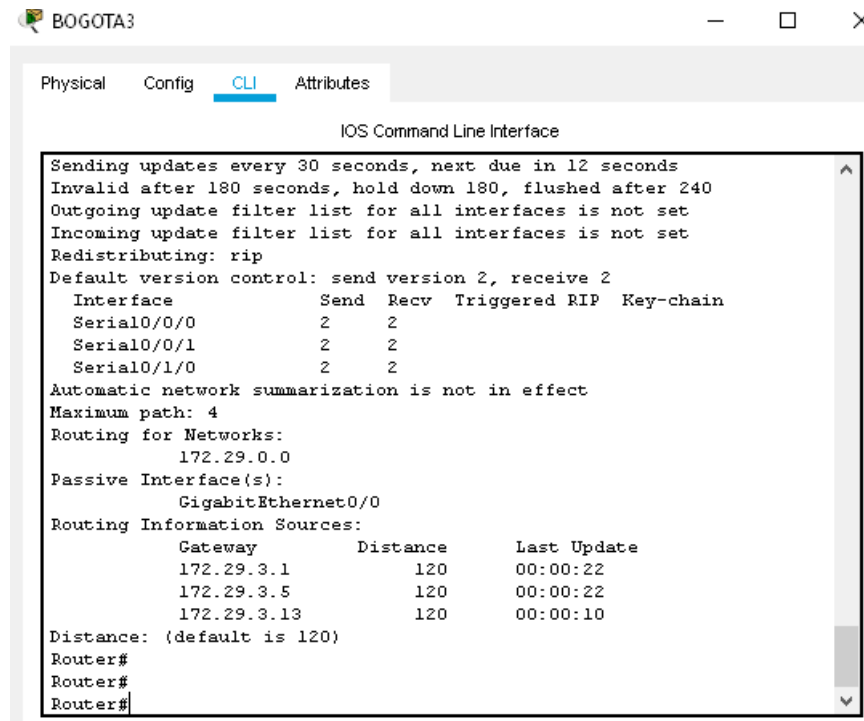
IOS Command Line Interface

```

Router#show ip protocols
Routing Protocol is "rip"
Sending updates every 30 seconds, next due in 25 seconds
Invalid after 180 seconds, hold down 180, flushed after 240
Outgoing update filter list for all interfaces is not set
Incoming update filter list for all interfaces is not set
Redistributing: rip
Default version control: send version 2, receive 2
  Interface          Send  Recv  Triggered RIP  Key-chain
  Serial0/0/0         2     2
  Serial0/0/1         2     2
Automatic network summarization is not in effect
Maximum path: 4
Routing for Networks:
  172.29.0.0
Passive Interface(s):
  GigabitEthernet0/0
Routing Information Sources:
  Gateway         Distance      Last Update
  172.29.3.9       120           00:00:16
  172.29.3.14      120           00:00:06
Distance: (default is 120)
Router#
Router#
  
```

Ilustración 12: Enrutamiento BOGOTÁ2

Router BOGOTÁ3



```
Physical Config CLI Attributes
IOS Command Line Interface

Sending updates every 30 seconds, next due in 12 seconds
Invalid after 180 seconds, hold down 180, flushed after 240
Outgoing update filter list for all interfaces is not set
Incoming update filter list for all interfaces is not set
Redistributing: rip
Default version control: send version 2, receive 2
  Interface      Send Recv Triggered RIP Key-chain
Serial0/0/0      2    2
Serial0/0/1      2    2
Serial0/1/0      2    2
Automatic network summarization is not in effect
Maximum path: 4
Routing for Networks:
  172.29.0.0
Passive Interface(s):
  GigabitEthernet0/0
Routing Information Sources:
  Gateway        Distance      Last Update
  172.29.3.1      120           00:00:22
  172.29.3.5      120           00:00:22
  172.29.3.13     120           00:00:10
Distance: (default is 120)
Router#
Router#
Router#
```

Ilustración 13: Enrutamiento BOGOTÁ3

- b. Verificar y documentar la base de datos de RIP de cada router, donde se informa de manera detallada de todas las rutas hacia cada red.

Se realiza verificación para cada uno de los dispositivos mediante el comando `show ip route connected`

MEDELLIN1

```
Router(config-router)#do show ip route connected
C 172.29.6.0/30 is directly connected, Serial0/0/1
C 172.29.6.8/30 is directly connected, Serial0/1/0
C 172.29.6.12/30 is directly connected, Serial0/1/1
C 209.17.220.0/30 is directly connected, Serial0/0/0
```

BOGOTÁ1


```
Router(config-router)#do show ip route connected
C 172.29.3.0/30 is directly connected, Serial0/1/0
C 172.29.3.4/30 is directly connected, Serial0/1/1
C 172.29.3.8/30 is directly connected, Serial0/0/1
C 209.17.220.4/30 is directly connected, Serial0/0/0
```

Parte 5: Configurar encapsulamiento y autenticación PPP.

1.

- a. Según la topología se requiere que el enlace Medellín1 con ISP sea configurado con autenticación PAT.
- b. El enlace Bogotá1 con ISP se debe configurar con autenticación CHAT.

ISP

```
Router>ENABLE
Router#conf t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#hostname ISP
ISP(config)#username MEDELLIN password cisco
ISP(config)#int s0/0/0
ISP(config-if)#encapsulation ppp
ISP(config-if)#
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/0/0, changed state
to down
ISP(config-if)#ppp authentication pap
ISP(config-if)#ppp pap sent-username ISP password cisco
ISP(config-if)#
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/0/0, changed state
to up

ISP(config-if)#EXIT
ISP(config)#username BOGOTA password cisco
```

```
ISP(config)#int s0/0/1
ISP(config-if)#encapsulation ppp
ISP(config-if)#
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/0/1, changed state
to down
ISP(config-if)#ppp authentication chap
```

MEDELLIN1

```
Router#conf t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#hostname MEDELLIN
MEDELLIN(config)#username ISP password cisco
MEDELLIN(config)#
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/0/0, changed state
to down
MEDELLIN(config)#int s0/0/0
MEDELLIN(config-if)#encapsulation ppp
MEDELLIN(config-if)#ppp authentication pap
MEDELLIN(config-if)#ppp pap sent-username MEDELLIN password cisco
MEDELLIN(config-if)#end
MEDELLIN#
%SYS-5-CONFIG_I: Configured from console by console
MEDELLIN#ping 209.17.220.1
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 209.17.220.1, timeout is 2 seconds:
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/0/0, changed state
to up
.....
Success rate is 0 percent (0/5)

MEDELLIN#ping 209.17.220.1
```

Type escape sequence to abort.

Sending 5, 100-byte ICMP Echos to 209.17.220.1, timeout is 2 seconds:

!!!!

Success rate is 100 percent (5/5), round-trip min/avg/max = 3/4/9 ms

BOGOTA

```
Router>enable
```

```
Router#conf t
```

Enter configuration commands, one per line. End with CNTL/Z.

```
Router(config)#hostname BOGOTA
```

```
BOGOTA(config)#username ISP password cisco
```

```
BOGOTA(config)#
```

```
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/0/0, changed state to down
```

```
BOGOTA(config)#int s0/0/0
```

```
BOGOTA(config-if)#encapsulation ppp
```

```
BOGOTA(config-if)#ppp authentication chap
```

```
BOGOTA(config-if)#
```

```
BOGOTA(config-if)#
```

Parte 6: Configuración de PAT.

- a. En la topología, si se activa NAT en cada equipo de salida (Bogotá1 y Medellín1), los routers internos de una ciudad no podrán llegar hasta los routers internos en el otro extremo, sólo existirá comunicación hasta los routers Bogotá1, ISP y Medellín1.
- b. Después de verificar lo indicado en el paso anterior proceda a configurar el NAT en el router Medellín1. Compruebe que la traducción de direcciones indique las interfaces de entrada y de salida. Al realizar una prueba de ping, la dirección debe ser traducida automáticamente a la dirección de la interfaz serial 0/1/0 del router Medellín1, cómo diferente puerto.

- c. Proceda a configurar el NAT en el router Bogotá1. Compruebe que la traducción de direcciones indique las interfaces de entrada y de salida. Al realizar una prueba de ping, la dirección debe ser traducida automáticamente a la dirección de la interfaz serial 0/1/0 del router Bogotá1, cómo diferente puerto.

MEDELLIN 1

```
MEDELLIN>enable
```

```
MEDELLIN#conf t
```

Enter configuration commands, one per line. End with CNTL/Z.

```
MEDELLIN(config)#ip nat inside source list 1 interface s0/0/0 ovserload
```

```
MEDELLIN(config)#
```

```
MEDELLIN(config)#ip nat inside source list 1 interface s0/0/0 overload
```

```
MEDELLIN(config)#access-list 1 permit 172.29.4.0 0.0.3.255
```

```
MEDELLIN(config)#
```

```
MEDELLIN(config)# INT S0/0/0
```

```
MEDELLIN(config-if)#ip nat outside
```

```
MEDELLIN(config-if)# INT S0/0/1
```

```
MEDELLIN(config-if)#ip nat intside
```

```
MEDELLIN(config-if)#ip nat inside
```

```
MEDELLIN(config-if)# INT S0/1/1
```

```
MEDELLIN(config-if)#ip nat inside
```

```
MEDELLIN(config-if)#INT S0/1/0
```

```
MEDELLIN(config-if)#ip nat inside
```

```
MEDELLIN(config-if)#
```

BOGOTA1

```
BOGOTA>ENABLE
```

```
BOGOTA#conf t
```

Enter configuration commands, one per line. End with CNTL/Z.

```
BOGOTA(config)#ip nat inside source list 1 interface s0/0/0 overload
BOGOTA(config)#access-list 1 permit 172.29.0.0 0.0.3.255
BOGOTA(config)#int s0/0/0
BOGOTA(config-if)#ip nat outside
BOGOTA(config-if)#int s0/1/0
BOGOTA(config-if)#ip nat inside
BOGOTA(config-if)#int s0/1/1
BOGOTA(config-if)#ip nat inside
BOGOTA(config-if)#
```

Parte 7: Configuración del servicio DHCP.

- a. Configurar la red Medellín2 y Medellín3 donde el router Medellín 2 debe ser el servidor DHCP para ambas redes Lan.

MEDELLIN2

```
Router>enable
Router#conf t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#ip dhcp excluded-address 172.29.4.1 172.29.4.5
Router(config)#ip dhcp excluded-address 172.29.4.129 172.29.4.133
Router(config)#ip dhcp pool MEDELLIN2
Router(dhcp-config)#network 172.29.4.0 255.255.255.128
Router(dhcp-config)#default-router 172.29.4.1
Router(dhcp-config)#dns-server 8.8.8.8
Router(dhcp-config)#exit
Router(config)#ip dhcp pool MEDELLIN3
Router(dhcp-config)#network 172.29.4.128 255.255.255.128
Router(dhcp-config)#default-router 172.29.4.129
Router(dhcp-config)#dns-server 8.8.8.8
Router(dhcp-config)#exit
```

MEDELLIN3

Router>ENABLE

Router#conf t

Enter configuration commands, one per line. End with CNTL/Z.

Router(config)#int g0/0

Router(config-if)#ip helper-address 172.29.6.5

Router(config-if)#

- b. El router Medellín3 deberá habilitar el paso de los mensajes broadcast hacia la IP del router Medellín2.
- c. Configurar la red Bogotá2 y Bogotá3 donde el router Medellín2 debe ser el servidor DHCP para ambas redes Lan.
- d. Configure el router Bogotá1 para que habilite el paso de los mensajes Broadcast hacia la IP del router Bogotá2.

BOGOTA3

Router>enable

Router#conf t

Enter configuration commands, one per line. End with CNTL/Z.

Router(config)#ip dhcp excluded-address 172.29.1.1 172.29.1.5

Router(config)#ip dhcp excluded-address 172.29.0.1 172.29.0.5

Router(config)#ip dhcp pool BOGOTA2

Router(dhcp-config)#NETWORK 172.29.1.0 255.255.255.0

Router(dhcp-config)#DEFAULT-ROUTER 172.29.1.1

Router(dhcp-config)#DEFAULT-ROUTER 172.29.1.1

Router(dhcp-config)#dns-server 8.8.8.8

Router(dhcp-config)#ip dhcp pool BOGOTA3

Router(dhcp-config)#NETWORK 172.29.0.0 255.255.255.0

Router(dhcp-config)#DEFAULT-ROUTER 172.29.0.1

```
Router(dhcp-config)#dns-server 8.8.8.8
```

```
Router(dhcp-config)#
```

BOGOTA3

```
Router>ENABLE
```

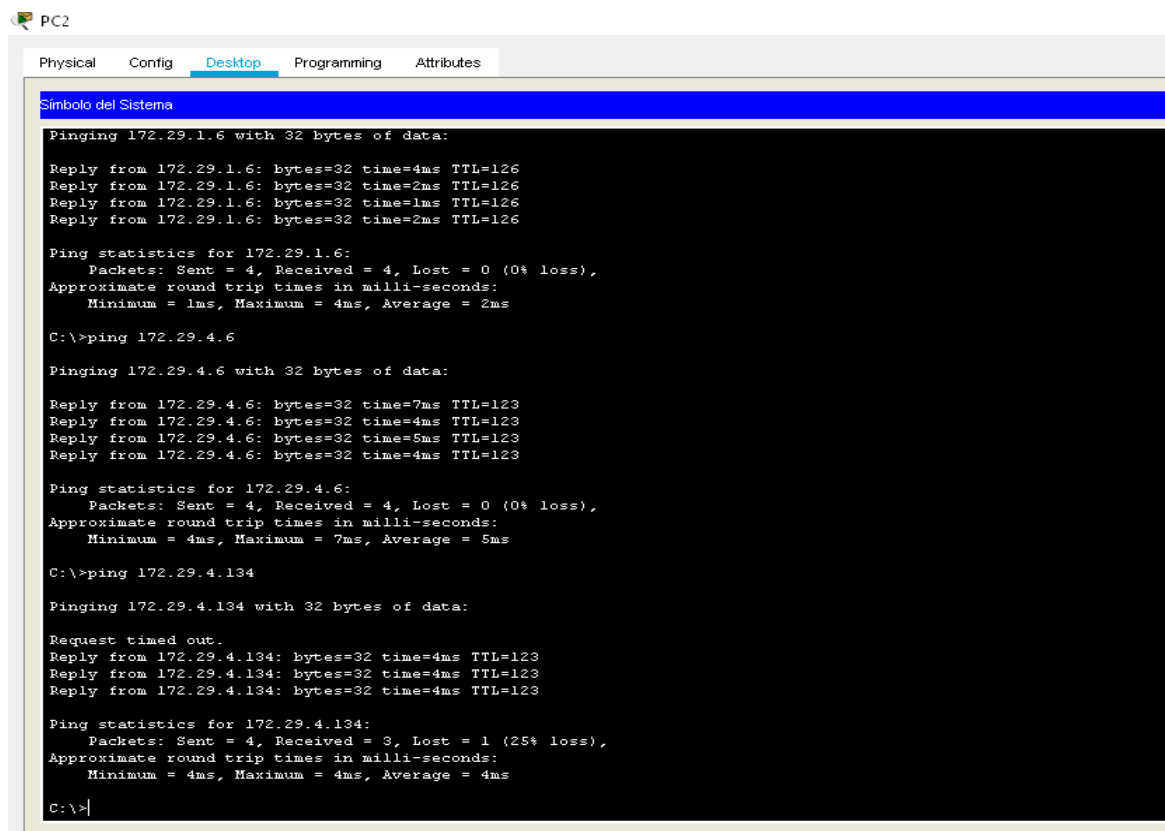
```
Router#conf t
```

Enter configuration commands, one per line. End with CNTL/Z.

```
Router(config)#int g0/0
```

```
Router(config-if)#ip helper-address 172.29.3.13
```

```
Router(config-if)#
```



The screenshot shows a Windows PC terminal window titled "PC2" with tabs for Physical, Config, Desktop, Programming, and Attributes. The "Desktop" tab is active, displaying a command prompt window. The command prompt shows the results of three ping commands: 1. Ping to 172.29.1.6: Successful, 4 packets received, 0% loss, average time 2ms. 2. Ping to 172.29.4.6: Successful, 4 packets received, 0% loss, average time 5ms. 3. Ping to 172.29.4.134: Partially successful, 3 packets received, 25% loss, average time 4ms.

```
PC2
Physical Config Desktop Programming Attributes
Simbolo del Sistema
C:\>ping 172.29.1.6

Pinging 172.29.1.6 with 32 bytes of data:

Reply from 172.29.1.6: bytes=32 time=4ms TTL=126
Reply from 172.29.1.6: bytes=32 time=2ms TTL=126
Reply from 172.29.1.6: bytes=32 time=1ms TTL=126
Reply from 172.29.1.6: bytes=32 time=2ms TTL=126

Ping statistics for 172.29.1.6:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 1ms, Maximum = 4ms, Average = 2ms

C:\>ping 172.29.4.6

Pinging 172.29.4.6 with 32 bytes of data:

Reply from 172.29.4.6: bytes=32 time=7ms TTL=123
Reply from 172.29.4.6: bytes=32 time=4ms TTL=123
Reply from 172.29.4.6: bytes=32 time=5ms TTL=123
Reply from 172.29.4.6: bytes=32 time=4ms TTL=123

Ping statistics for 172.29.4.6:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 4ms, Maximum = 7ms, Average = 5ms

C:\>ping 172.29.4.134

Pinging 172.29.4.134 with 32 bytes of data:

Request timed out.
Reply from 172.29.4.134: bytes=32 time=4ms TTL=123
Reply from 172.29.4.134: bytes=32 time=4ms TTL=123
Reply from 172.29.4.134: bytes=32 time=4ms TTL=123

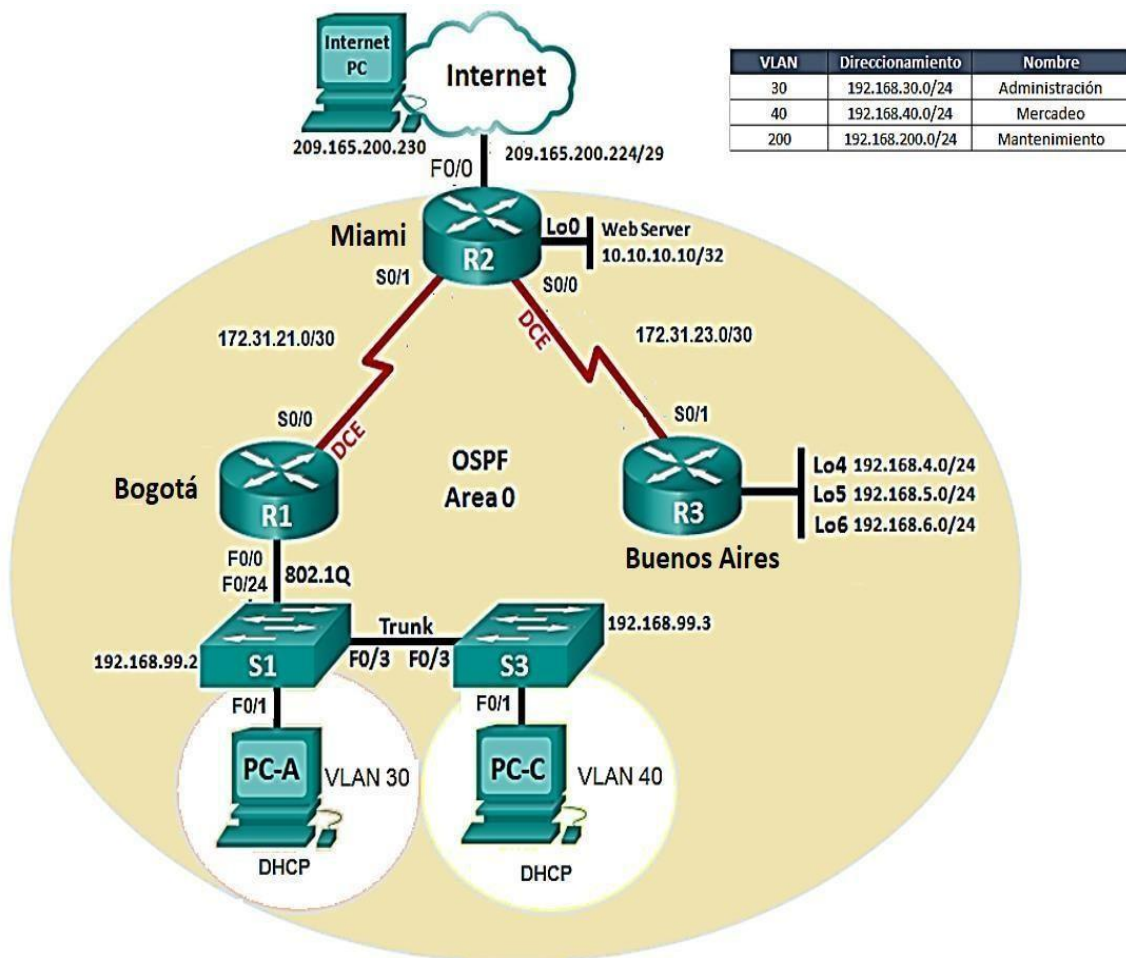
Ping statistics for 172.29.4.134:
    Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 4ms, Maximum = 4ms, Average = 4ms

C:\>
```

Ilustración 14: Ping de extremo a extremo – pc

4 ESCENARIO 2

Escenario: Una empresa de Tecnología posee tres sucursales distribuidas en las ciudades de Miami, Bogotá y Buenos Aires, en donde el estudiante será el administrador de la red, el cual deberá configurar e interconectar entre sí cada uno de los dispositivos que forman parte del escenario, acorde con los lineamientos establecidos para el direccionamiento IP, protocolos de enrutamiento y demás aspectos que forman parte de la topología de red.



1. Configurar el direccionamiento ip acorde con la topología de red para cada uno de los dispositivos que forman parte del escenario

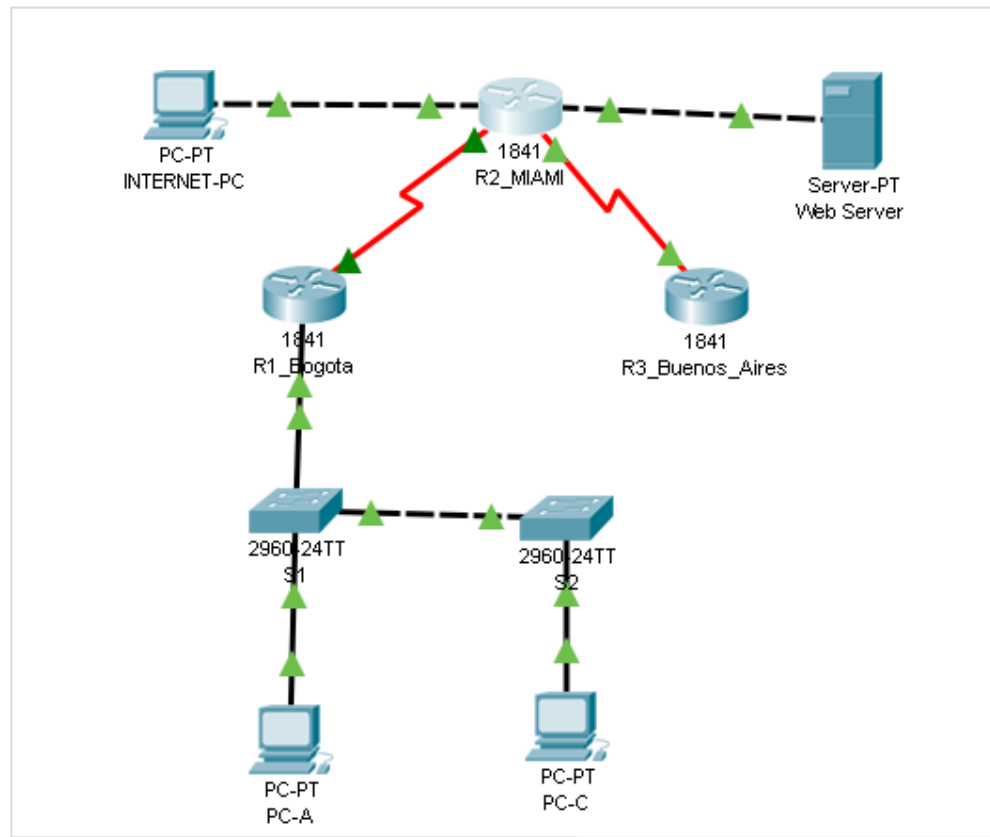


Ilustración 15: Topología

Se realiza la respectiva configuración de enrutamiento para cada uno de los dispositivos, según la topología

R2_MIAMI

```
R2_MIAMI>enable
```

```
R2_MIAMI#conf t
```

Enter configuration commands, one per line. End with CNTL/Z.

```
R2_MIAMI(config)#int f0/0
```

```
R2_MIAMI(config-if)#description Internet
```

```

R2_MIAMl(config-if)#ip address 209.165.200.225 255.255.255.248
R2_MIAMl(config-if)#no shut
R2_MIAMl(config-if)#
%LINK-5-CHANGED: Interface FastEthernet0/0, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0, changed
state to up
R2_MIAMl(config-if)#int f0/1
R2_MIAMl(config-if)#description Conexion Web Server
R2_MIAMl(config-if)#ip address 10.10.10.1 255.255.255.0
R2_MIAMl(config-if)#no shut
R2_MIAMl(config-if)#
%LINK-5-CHANGED: Interface FastEthernet0/1, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/1, changed
state to up
R2_MIAMl(config-if)#int s0/0/0
R2_MIAMl(config-if)#ip address 172.31.23.1 255.255.255.252
R2_MIAMl(config-if)#clock rate 128000
R2_MIAMl(config-if)#no shut
%LINK-5-CHANGED: Interface Serial0/0/0, changed state to down
R2_MIAMl(config-if)#int s0/0/1
R2_MIAMl(config-if)#ip address 172.31.21.2 255.255.255.252
R2_MIAMl(config-if)#no shut
%LINK-5-CHANGED: Interface Serial0/0/1, changed state to down
R2_MIAMl(config-if)#

```

R3_Buenos_Aires

```

Router>enable
Router#conf t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#int s0/0/1
Router(config-if)#ip address 172.31.23.2 255.255.255.252

```

Router(config-if)#no shut

Router(config-if)#

%LINK-5-CHANGED: Interface Serial0/0/1, changed state to up

Router(config-if)#

%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/0/1, changed state to up

Router(config-if)#exit

Router(config)#hostname R3_Buenos_Aires

R3_Buenos_Aires(config)#int lo4

R3_Buenos_Aires(config-if)#

%LINK-5-CHANGED: Interface Loopback4, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface Loopback4, changed state to up

R3_Buenos_Aires(config-if)#ip address 192.168.4.1 255.255.255.0

R3_Buenos_Aires(config-if)#no shut

R3_Buenos_Aires(config-if)#int loop5

R3_Buenos_Aires(config-if)#

%LINK-5-CHANGED: Interface Loopback5, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface Loopback5, changed state to up

R3_Buenos_Aires(config-if)#ip address 192.168.5.1 255.255.255.0

R3_Buenos_Aires(config-if)#no shut

R3_Buenos_Aires(config-if)#int loop6

R3_Buenos_Aires(config-if)#

%LINK-5-CHANGED: Interface Loopback6, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface Loopback6, changed state to up

R3_Buenos_Aires(config-if)#ip address 192.168.6.1 255.255.255.0

R3_Buenos_Aires(config-if)#no shut

R3_Buenos_Aires(config-if)#

R1_Bogota

R1_Bogota>enable

R1_Bogota#conf t

Enter configuration commands, one per line. End with CNTL/Z.

R1_Bogota(config)#interface f0/0

R1_Bogota(config-if)#ip address 192.168.30.1 255.255.255.0

R1_Bogota(config-if)#no shut

R1_Bogota(config-if)#exit

R1_Bogota(config)#int s0/0/

^

% Invalid input detected at '^' marker.

R1_Bogota(config)#int s0/0/0

R1_Bogota(config-if)#ip address 172.31.21.1 255.255.255.252

R1_Bogota(config-if)#no shut

R1_Bogota(config-if)#exit

R1_Bogota(config)#

S1

Switch>

Switch>enable

Switch#config

Configuring from terminal, memory, or network [terminal]?

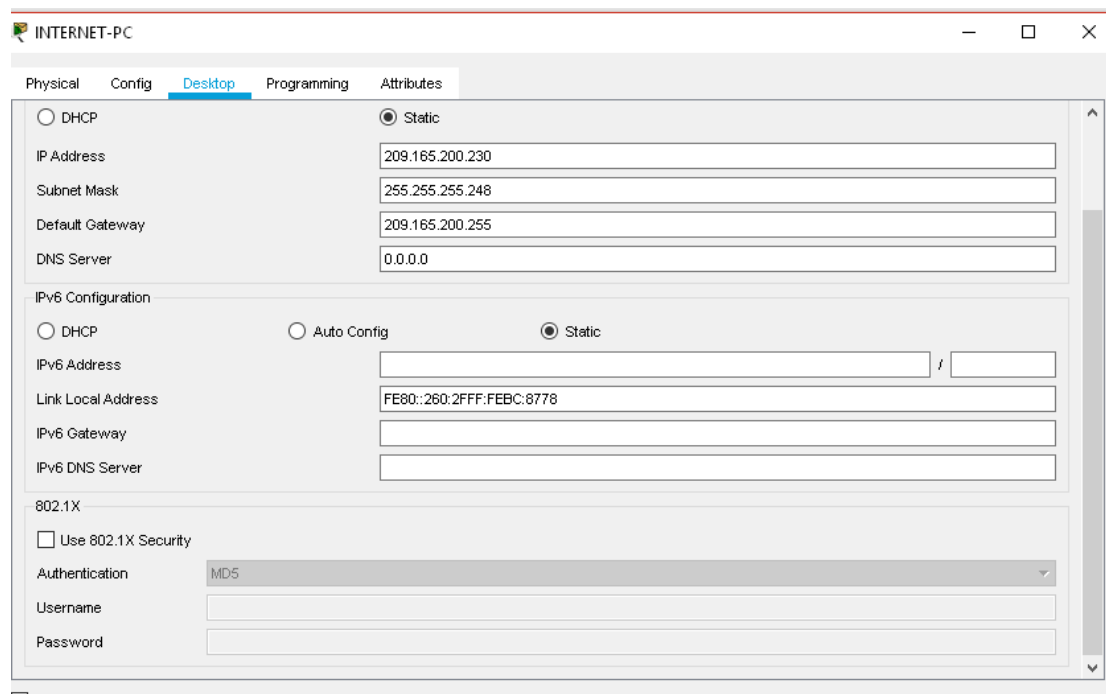
Enter configuration commands, one per line. End with CNTL/Z.

```
Switch(config)#hostname S1
S1(config)#no ip domain-lookup
S1(config)#end
```

S3

```
Switch>enable
Switch#config
Configuring from terminal, memory, or network [terminal]?
Enter configuration commands, one per line. End with CNTL/Z.
Switch(config)#hostname S3
S3(config)#no ip domain-lookup
S3(config)#
```

INTERNET-PC



The screenshot shows a configuration window titled "INTERNET-PC" with tabs for Physical, Config, Desktop (selected), Programming, and Attributes. The Desktop tab contains the following settings:

- Static IP Configuration:**
 - ☒ Static
 - IP Address: 209.165.200.230
 - Subnet Mask: 255.255.255.248
 - Default Gateway: 209.165.200.255
 - DNS Server: 0.0.0.0
- IPv6 Configuration:**
 - ☐ DHCP, ☐ Auto Config, ☒ Static
 - IPv6 Address: [empty]
 - Link Local Address: FE80::260:2FFF:FEBC:8778
 - IPv6 Gateway: [empty]
 - IPv6 DNS Server: [empty]
- 802.1X:**
 - ☐ Use 802.1X Security
 - Authentication: MD5
 - Username: [empty]
 - Password: [empty]

Ilustración 16: Configuración ip-internet pc

WEB SERVER

Web Server

Physical Config Services **Desktop** Programming Attributes

☐ DHCP ☒ Static

IP Address: 10.10.10.10

Subnet Mask: 255.255.255.0

Default Gateway: 10.10.10.1

DNS Server: 0.0.0.0

IPv6 Configuration

☐ DHCP ☐ Auto Config ☒ Static

IPv6 Address: /

Link Local Address: FE80::20C:85FF:FE54:AC62

IPv6 Gateway:

IPv6 DNS Server:

802.1X

☐ Use 802.1X Security

Authentication: MD5

Username:

Password:

☐ Top

Ilustración 17: Configuración Ip WEB SERVER

PC-A

PC-A

Physical Config **Desktop** Programming Attributes

☐ DHCP ☒ Static

IP Address: 192.168.30.5

Subnet Mask: 255.255.255.0

Default Gateway: 192.168.30.1

DNS Server: 10.10.10.11

IPv6 Configuration

☐ DHCP ☐ Auto Config ☒ Static

IPv6 Address: /

Link Local Address: FE80::201:C9FF:FEC2:DCB3

IPv6 Gateway:

IPv6 DNS Server:

802.1X

☐ Use 802.1X Security

Authentication: MD5

Username:

Password:

☐ Top

Ilustración 18: configuración ip- PC-A

PC-C

The screenshot shows the 'PC-C' configuration window with the 'Desktop' tab selected. The 'Static' radio button is chosen for IP configuration. The fields are filled with: IP Address: 192.168.40.5, Subnet Mask: 255.255.255.0, Default Gateway: 192.168.40.1, and DNS Server: 10.10.10.11. Under 'IPv6 Configuration', the 'Static' radio button is also selected. The IPv6 Address field is empty, followed by a slash and another empty field. The Link Local Address is FE80::20D:BDF:FE9A:5EA3. The IPv6 Gateway and IPv6 DNS Server fields are empty. In the '802.1X' section, 'Use 802.1X Security' is unchecked, and the Authentication dropdown is set to 'MD5'. The Username and Password fields are empty. A 'Top' button is at the bottom left.

Ilustración 19: Configuración ip PC-C

2. Configurar el protocolo de enrutamiento OSPFv2 bajo los siguientes criterios:

OSPFv2 area 0

Configuration Item or Task	Specification
Router ID R1	1.1.1.1
Router ID R2	5.5.5.5
Router ID R3	8.8.8.8
Configurar todas las interfaces LAN como pasivas	
Establecer el ancho de banda para enlaces seriales en	256 Kb/s
Ajustar el costo en la métrica de S0/0 a	9500

R1_Bogota

R3_Bogota>enable

R3_Bogota#conf t

Enter configuration commands, one per line. End with CNTL/Z.

R3_Bogota(config)#hostname R1_Bogota

R1_Bogota(config)#router ospf 1

R1_Bogota(config-router)#router-id 1.1.1.1

R1_Bogota(config-router)#

R1_Bogota(config-router)#network 172.31.21.0 0.0.0.0 area 0

R1_Bogota(config-router)#network 172.31.21.0 0.0.0.3 area 0

R1_Bogota(config-router)#network 192.168.30.0 0.0.0.3 area 0

R1_Bogota(config-router)#network 192.168.40.0 0.0.0.3 area 0

R1_Bogota(config-router)#network 192.168.200.0 0.0.0.3 area 0

R1_Bogota(config-router)#int s0/0/0

R1_Bogota(config-if)#bandwidth 256

R1_Bogota(config-if)#ip ospf cost 9500

R1_Bogota(config-if)#exit

R1_Bogota(config)#route ospf 1

R1_Bogota(config-router)#auto-cost refere

% Incomplete command.

R1_Bogota(config-router)#auto-cost reference-bandwidth 9500

% OSPF: Reference bandwidth is changed.

Please ensure reference bandwidth is consistent across all routers.

R1_Bogota(config-router)#

R1_Bogota(config-router)#

R2_MIAMI

R2_MIAMI>enable

R2_MIAMI#conf t

Enter configuration commands, one per line. End with CNTL/Z.

```
R2_Miami(config)#route ospf 1
```

```
R2_Miami(config-router)#router-id 5.5.5.5
```

```
R2_Miami(config-router)#network 172.31.21.0 0.0.0.3 area 0
```

```
R2_Miami(config-router)#
```

```
01:03:50: %OSPF-5-ADJCHG: Process 1, Nbr 1.1.1.1 on Serial0/0/1 from LOADING  
to FULL, Loading Done
```

```
R2_Miami(config-router)#network 172.31.23.0 0.0.0.3 area 0
```

```
R2_Miami(config-router)#network 10.10.10.0 0.0.0.255 area 0
```

```
R2_Miami(config-router)#auto-cost reference-bandwidth 9500
```

```
% OSPF: Reference bandwidth is changed.
```

Please ensure reference bandwidth is consistent across all routers.

```
R2_Miami(config-router)#
```

```
R2_Miami(config-router)#int s0/0/0
```

```
R2_Miami(config-if)#bandwidth 256
```

```
R2_Miami(config-if)#ip ospf cost 9500
```

```
R2_Miami(config-if)#exit
```

```
R2_Miami(config)#exit
```

```
R2_Miami#
```

```
%SYS-5-CONFIG_I: Configured from console by console
```

R3_Buenos_Aires

```
R3_Buenos_Aires>enable
```

```
R3_Buenos_Aires#conf t
```

Enter configuration commands, one per line. End with CNTL/Z.

```
R3_Buenos_Aires(config)#router ospf 1
```

```
R3_Buenos_Aires(config-router)#router-id 8.8.8.8
```

```
R3_Buenos_Aires(config-router)#network 172.31.23.0 0.0.0.3 area 0
```

```
R3_Buenos_Aires(config-router)#
```

```
01:09:16: %OSPF-5-ADJCHG: Process 1, Nbr 5.5.5.5 on Serial0/0/1 from LOADING  
to FULL, Loading Done
```

```

R3_Buenos_Aires(config-router)#network 192.168.4.0 0.0.3.255 area 0
R3_Buenos_Aires(config-router)#passive-interface lo4
R3_Buenos_Aires(config-router)#passive-interface lo5
R3_Buenos_Aires(config-router)#passive-interface lo6
R3_Buenos_Aires(config-router)#auto-cost reference-bandwidth 9500
% OSPF: Reference bandwidth is changed.

```

Please ensure reference bandwidth is consistent across all routers.

```

R3_Buenos_Aires(config-router)#exit
R3_Buenos_Aires(config)#int s0/0/1
R3_Buenos_Aires(config-if)#bandwidth 256
R3_Buenos_Aires(config-if)#exit
R3_Buenos_Aires(config)#exit
R3_Buenos_Aires#
%SYS-5-CONFIG_I: Configured from console by console

```

- Verificar información de OSPF
- Visualizar tablas de enrutamiento y routers conectados por OSPFv2

R1_Bogota

```

R1_Bogota>enable
R1_Bogota#show ip ospf neighbor

```

Neighbor ID	Pri	State	Dead Time	Address	Interface
5.5.5.5	0	FULL/ -	00:00:34	172.31.21.2	Serial0/0/0

```

R1_Bogota#

```

Ilustración 20: Enrutamiento R1

R2_MIAMI

```
R2_MIAMI#show ip ospf neighbor
```

Neighbor ID	Pri	State	Dead Time	Address	Interface
8.8.8.8	0	FULL/ -	00:00:39	172.31.23.2	Serial0/0/0
1.1.1.1	0	FULL/ -	00:00:35	172.31.21.1	Serial0/0/1

```
R2_MIAMI#
```

Ilustración 21: Enrutamiento R2

R3_Buenos_Aires

```
R3_Buenos_Aires#show ip ospf neighbor
```

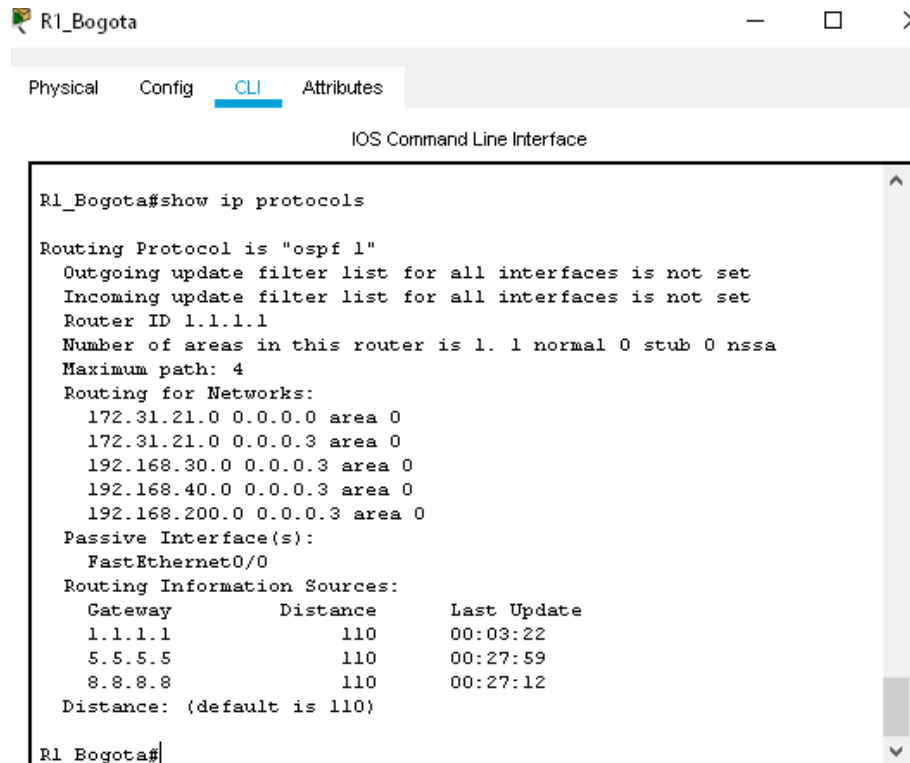
Neighbor ID	Pri	State	Dead Time	Address	Interface
5.5.5.5	0	FULL/ -	00:00:38	172.31.23.1	Serial0/0/1

```
R3_Buenos_Aires#
```

Ilustración 22: Enrutamiento R3

- Visualizar lista resumida de interfaces por OSPF en donde se ilustre el costo de cada interface
- Visualizar el OSPF Process ID, Router ID, Address summarizations, Routing Networks, and passive interfaces configuradas en cada router.

Se realiza verificación mediante el comando **show ip protocols**



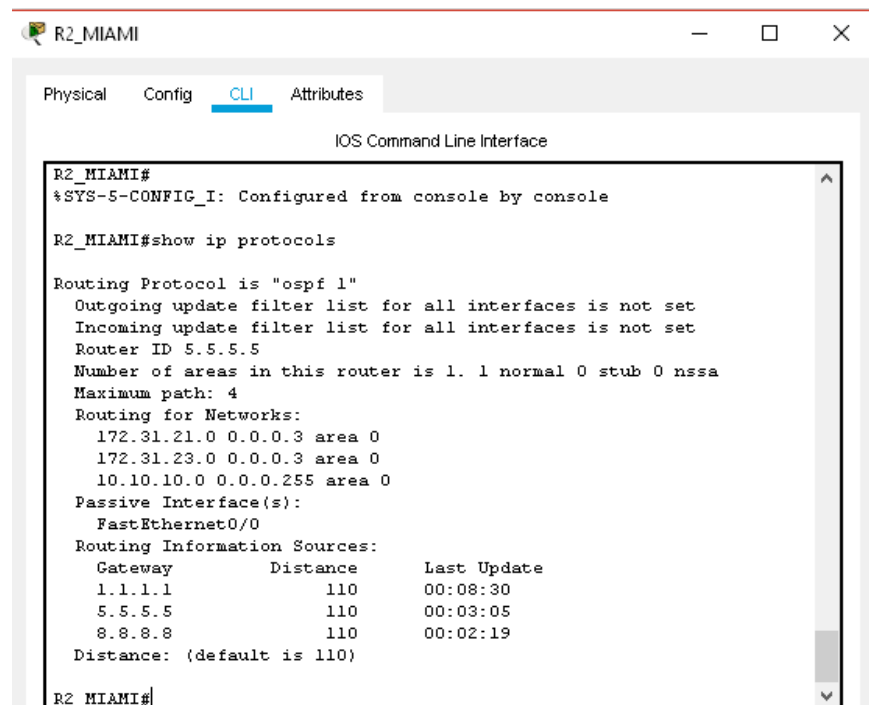
The screenshot shows the CLI of router R1_Bogota. The 'CLI' tab is selected. The command 'show ip protocols' has been entered, displaying the following configuration:

```
R1_Bogota#show ip protocols

Routing Protocol is "ospf 1"
  Outgoing update filter list for all interfaces is not set
  Incoming update filter list for all interfaces is not set
  Router ID 1.1.1.1
  Number of areas in this router is 1. 1 normal 0 stub 0 nssa
  Maximum path: 4
  Routing for Networks:
    172.31.21.0 0.0.0.0 area 0
    172.31.21.0 0.0.0.3 area 0
    192.168.30.0 0.0.0.3 area 0
    192.168.40.0 0.0.0.3 area 0
    192.168.200.0 0.0.0.3 area 0
  Passive Interface(s):
    FastEthernet0/0
  Routing Information Sources:
    Gateway         Distance      Last Update
    1.1.1.1          110          00:03:22
    5.5.5.5          110          00:27:59
    8.8.8.8          110          00:27:12
  Distance: (default is 110)
```

The prompt returns to 'R1_Bogota#'.

Ilustración 23: R1 Interfaz Pasiva



The screenshot shows the CLI of router R2_MIAMI. The 'CLI' tab is selected. The command 'show ip protocols' has been entered, displaying the following configuration:

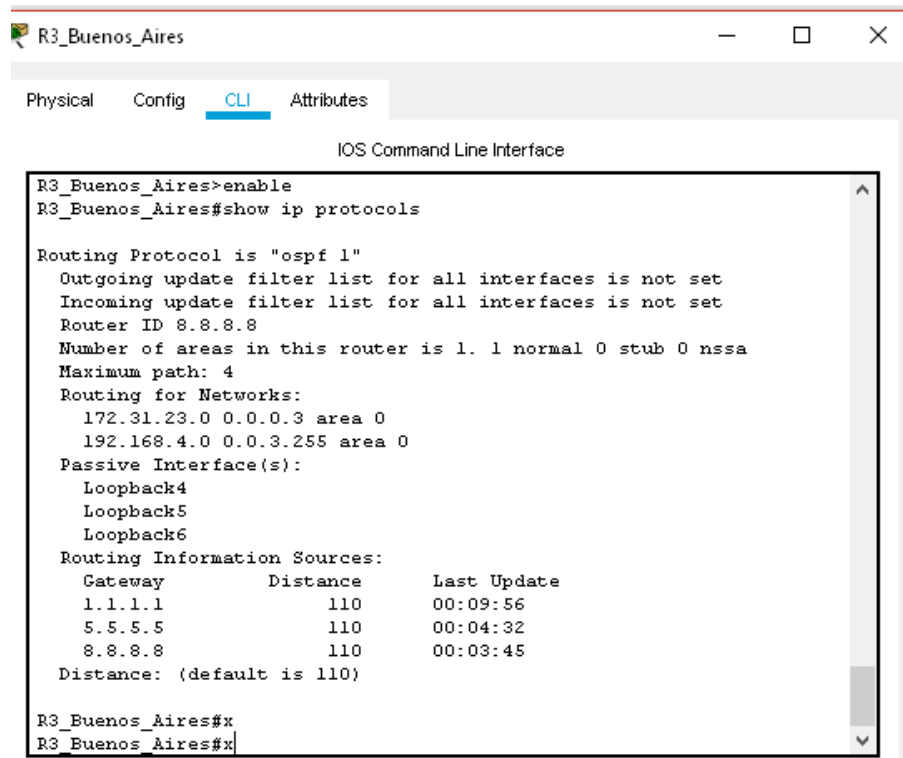
```
R2_MIAMI#
%SYS-5-CONFIG_I: Configured from console by console

R2_MIAMI#show ip protocols

Routing Protocol is "ospf 1"
  Outgoing update filter list for all interfaces is not set
  Incoming update filter list for all interfaces is not set
  Router ID 5.5.5.5
  Number of areas in this router is 1. 1 normal 0 stub 0 nssa
  Maximum path: 4
  Routing for Networks:
    172.31.21.0 0.0.0.3 area 0
    172.31.23.0 0.0.0.3 area 0
    10.10.10.0 0.0.0.255 area 0
  Passive Interface(s):
    FastEthernet0/0
  Routing Information Sources:
    Gateway         Distance      Last Update
    1.1.1.1          110          00:08:30
    5.5.5.5          110          00:03:05
    8.8.8.8          110          00:02:19
  Distance: (default is 110)
```

The prompt returns to 'R2_MIAMI#'.

Ilustración 24: R2 interfaz pasiva

The screenshot shows a web-based CLI interface for a device named R3_Buenos_Aires. The interface has tabs for Physical, Config, CLI (selected), and Attributes. The main window displays the output of the 'show ip protocols' command. The output indicates that OSPF is configured with Router ID 8.8.8.8, one normal area (0), and a maximum path of 4. It lists two networks in area 0: 172.31.23.0/24 and 192.168.4.0/24. It also lists three passive interfaces: Loopback4, Loopback5, and Loopback6. A table of routing information sources is shown with three entries: 1.1.1.1, 5.5.5.5, and 8.8.8.8, all with a distance of 110 and a last update time of 00:03:45. The interface ends with a prompt for the user to enter a command.

```
R3_Buenos_Aires>enable
R3_Buenos_Aires#show ip protocols

Routing Protocol is "ospf 1"
  Outgoing update filter list for all interfaces is not set
  Incoming update filter list for all interfaces is not set
  Router ID 8.8.8.8
  Number of areas in this router is 1. 1 normal 0 stub 0 nssa
  Maximum path: 4
  Routing for Networks:
    172.31.23.0 0.0.0.3 area 0
    192.168.4.0 0.0.3.255 area 0
  Passive Interface(s):
    Loopback4
    Loopback5
    Loopback6
  Routing Information Sources:
    Gateway         Distance      Last Update
    1.1.1.1           110          00:09:56
    5.5.5.5           110          00:04:32
    8.8.8.8           110          00:03:45
  Distance: (default is 110)

R3_Buenos_Aires#x
R3_Buenos_Aires#x
```

Ilustración 25: R3 interfaz pasiva

3. Configurar VLANs, Puertos troncales, puertos de acceso, encapsulamiento, Inter-VLAN Routing y Seguridad en los Switches acorde a la topología de red establecida.

Se realiza configuración sugerida para cada uno de los dispositivos.

S1

S1#conf t

Enter configuration commands, one per line. End with CNTL/Z.

S1(config)#vlan 30

S1(config-vlan)#name Administracion

S1(config-vlan)#name Administracion

S1(config-vlan)#vlan 40

S1(config-vlan)#name Mercadeo

```

S1(config-vlan)#vlan 200
S1(config-vlan)#name Mantenimiento
S1(config-vlan)#exit
S1(config)#int vlan 200
S1(config-if)#ip address 192.168.200.2 255.255.255.0
S1(config-if)#no ip address 192.168.200.2 255.255.255.0
S1(config-if)#ip address 192.168.99.2 255.255.255.0
S1(config-if)#no shut
S1(config-if)#exit
S1(config)#ip default-gateway 192.168.99.1
S1(config)#int f0/3
S1(config-if)#switchport mode trunk
S1(config-if)#
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/3, changed
state to down
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/3, changed
state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface Vlan200, changed state to
up
S1(config-if)#switchport trunk native vlan 1
S1(config-if)#int g0/1
S1(config-if)#switchport mode trunk
S1(config-if)#no shut
S1(config-if)#switchport trunk native vlan 1
S1(config-if)#int range fa0/1-2, fa0/4-23, g0/2
S1(config-if-range)#switchport mode access
S1(config-if-range)#int f0/1
S1(config-if)#switchport mode access
S1(config-if)#switchport access vlan 30
S1(config-if)#int range fa0/2, fa0/4-23, g0/1-2
S1(config-if-range)#shutdown

```

%LINK-5-CHANGED: Interface FastEthernet0/2, changed state to administratively down

%LINK-5-CHANGED: Interface FastEthernet0/4, changed state to administratively down

%LINK-5-CHANGED: Interface FastEthernet0/5, changed state to administratively down

%LINK-5-CHANGED: Interface FastEthernet0/6, changed state to administratively down

%LINK-5-CHANGED: Interface FastEthernet0/7, changed state to administratively down

%LINK-5-CHANGED: Interface FastEthernet0/8, changed state to administratively down

%LINK-5-CHANGED: Interface FastEthernet0/9, changed state to administratively down

%LINK-5-CHANGED: Interface FastEthernet0/10, changed state to administratively down

%LINK-5-CHANGED: Interface FastEthernet0/11, changed state to administratively down

%LINK-5-CHANGED: Interface FastEthernet0/12, changed state to administratively down

%LINK-5-CHANGED: Interface FastEthernet0/13, changed state to administratively down

%LK-5-CHANGED: Interface FastEthernet0/14, changed state to administratively down

%LINK-5-CHANGED: Interface FastEthernet0/15, changed state to administratively down

%LINK-5-CHANGED: Interface FastEthernet0/16, changed state to administratively down

%LINK-5-CHANGED: Interface FastEthernet0/17, changed state to administratively down

%LINK-5-CHANGED: Interface FastEthernet0/18, changed state to administratively down

%LINK-5-CHANGED: Interface FastEthernet0/19, changed state to administratively down

%LINK-5-CHANGED: Interface FastEthernet0/20, changed state to administratively down

%LINK-5-CHANGED: Interface FastEthernet0/21, changed state to administratively down

%LINK-5-CHANGED: Interface FastEthernet0/22, changed state to administratively down

%LINK-5-CHANGED: Interface FastEthernet0/23, changed state to administratively down

%LINK-5-CHANGED: Interface GigabitEthernet0/1, changed state to administratively down

%LINK-5-CHANGED: Interface GigabitEthernet0/2, changed state to administratively down

S1(config-if-range)#end

S1#

%SYS-5-CONFIG_I: Configured from console by console

S3

S3>enable

S3#conf t

Enter configuration commands, one per line. End with CNTL/Z.

S3(config)#vlan 30

S3(config-vlan)#name Administracion

S3(config-vlan)#vlan 40

S3(config-vlan)#name Mercadeo

S3(config-vlan)#vlan 200

S3(config-vlan)#name Mantenimiento

S3(config-vlan)#exit

S3(config)#int vlan 200

S3(config-if)#

%LINK-5-CHANGED: Interface Vlan200, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface Vlan200, changed state to up

S3(config-if)#ip address 192.168.99.3 255.255.255.0

S3(config-if)#no shut


```
S3(config-if)#exit
S3(config)#ip default-gateway 192.168.99.1
S3(config)#int f0/3
S3(config-if)#switchport mode trunk
S3(config-if)#switchport trunk native vlan 1
S3(config-if)#int range fa0/1-2, fa0/4-24, g0/1-2
S3(config-if-range)#switchport mode access
S3(config-if-range)#int f0/1
S3(config-if)#switchport mode access
S3(config-if)#switchport access vlan 40
S3(config-if)#int range fa0/2, fa0/4-24, g0/1-2
S3(config-if-range)#shut
%LINK-5-CHANGED: Interface FastEthernet0/2, changed state to administratively
down
%LINK-5-CHANGED: Interface FastEthernet0/4, changed state to administratively
down
%LINK-5-CHANGED: Interface FastEthernet0/5, changed state to administratively
down
%LINK-5-CHANGED: Interface FastEthernet0/6, changed state to administratively
down
%LINK-5-CHANGED: Interface FastEthernet0/7, changed state to administratively
down
%LINK-5-CHANGED: Interface FastEthernet0/8, changed state to administratively
down
%LINK-5-CHANGED: Interface FastEthernet0/9, changed state to administratively
down
%LINK-5-CHANGED: Interface FastEthernet0/10, changed state to administratively
don
%LINK-5-CHANGED: Interface FastEthernet0/11, changed state to administratively
down
%LINK-5-CHANGED: Interface FastEthernet0/12, changed state to administratively
down
%LINK-5-CHANGED: Interface FastEthernet0/13, changed state to administratively
down
```

```

%LINK-5-CHANGED: Interface FastEthernet0/14, changed state to administratively
down
%LINK-5-CHANGED: Interface FastEthernet0/15, changed state to administratively
down
%LINK-5-CHANGED: Interface FastEthernet0/16, changed state to administratively
down
%LINK-5-CHANGED: Interface FastEthernet0/17, changed state to administratively
down
%LINK-5-CHANGED: Interface FastEthernet0/18, changed state to administratively
down
%LINK-5-CHANGED: Interface FastEthernet0/19, changed state to administratively
down
%LINK-5-CHANGED: Interface FastEthernet0/20, changed state to administratively
down
%LINK-5-CHANGED: Interface FastEthernet0/21, changed state to administratively
down
%LINK-5-CHANGED: Interface FastEthernet0/22, changed state to administratively
down
%LINK-5-CHANGED: Interface FastEthernet0/23, changed state to administratively
down
%LINK-5-CHANGED: Interface FastEthernet0/24, changed state to administratively
down
%LINK-5-CHANGED:   Interface   GigabitEthernet0/1,   changed   state   to
administratively down
%LINK-5-CHANGED:   Interface   GigabitEthernet0/2,   changed   state   to
administratively down
S3(config-if-range)#end
S3#
%SYS-5-CONFIG_I: Configured from console by console

```

R1_Bogota

```
R1_Bogota>enable
```

```
R1_Bogota#conf t
```

Enter configuration commands, one per line. End with CNTL/Z.

```

R1_Bogota(config)#int f0/0
R1_Bogota(config-if)#int f0/0.30
R1_Bogota(config-subif)#
%LINK-5-CHANGED: Interface FastEthernet0/0.30, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0.30,
changed state to up
R1_Bogota(config-subif)#description administracion LAN
R1_Bogota(config-subif)#encapsulation dot1Q 30
R1_Bogota(config-subif)#ip add 192.168.30.1 255.255.255.0
% 192.168.30.0 overlaps with FastEthernet0/0
R1_Bogota(config-subif)#int f0/0.40
R1_Bogota(config-subif)#
%LINK-5-CHANGED: Interface FastEthernet0/0.40, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0.40,
changed state to up
R1_Bogota(config-subif)#description Mercadeo LAN
R1_Bogota(config-subif)#encapsulation dot1Q 40
R1_Bogota(config-subif)#ip add 192.168.40.1 255.255.255.0
R1_Bogota(config-subif)#int f0/0.200
R1_Bogota(config-subif)#
%LINK-5-CHANGED: Interface FastEthernet0/0.200, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0.200,
changed state to up
R1_Bogota(config-subif)#description Mantenimiento LAN
R1_Bogota(config-subif)#encapsulation dot1Q 200
R1_Bogota(config-subif)#ip add 192.168.200.1 255.255.255.0
R1_Bogota(config-subif)#exit

```

4. En el Switch 3 deshabilitar DNS lookup

Se habilita mediante el comando no ip domain-lookup

S3#conf t

Enter configuration commands, one per line. End with CNTL/Z.

S3(config)#no ip domain-lookup

S3(config)#

5. Asignar direcciones IP a los Switches acorde a los lineamientos.

S1

S1#conf t

Enter configuration commands, one per line. End with CNTL/Z.

S1(config)#vlan 30

S1(config-vlan)#name Administracion

S1(config-vlan)#vlan 40

S1(config-vlan)#name Mercadeo

S1(config-vlan)#vlan 200

S1(config-vlan)#Name Mantenimiento

S1(config-vlan)#exit

S1(config)#vlan 200

S1(config-vlan)#exit

S1(config)#int vlan 200

S1(config-if)#ip add 192.168.99.2 255.255.255.0

S1(config-if)#no shut

S1(config-if)#end

S1#

%SYS-5-CONFIG_I: Configured from console by console

S1#conf t

Enter configuration commands, one per line. End with CNTL/Z.

S1(config)#ip defaul

% Incomplete command.

```
S1(config)#ip default-gateway 192.168.99.1
```

```
S1(config)#exit
```

S3

```
S3>enable
```

```
S3#conf t
```

```
Enter configuration commands, one per line. End with CNTL/Z.
```

```
S3(config)#vlan 30
```

```
S3(config-vlan)#name Administracion
```

```
S3(config-vlan)#vlan 40
```

```
S3(config-vlan)#name Mercadeo
```

```
S3(config-vlan)#vlan 200
```

```
S3(config-vlan)#name Mantenimiento
```

```
S3(config-vlan)#exit
```

```
S3(config)#int vlan 200
```

```
S3(config-if)#ip add 192.168.99.3 255.255.255.0
```

```
S3(config-if)#no shut
```

```
S3(config-if)#end
```

```
S3#
```

```
%SYS-5-CONFIG_I: Configured from console by console
```

```
S3#conf t
```

```
Enter configuration commands, one per line. End with CNTL/Z.
```

```
S3(config)#ip default-gateway 192.168.99.1
```

```
S3(config)#int f0/3
```

```
S3(config-if)#switchport trunk native vlan 1
```

```
S3(config-if)#exit
```

- Desactivar todas las interfaces que no sean utilizadas en el esquema de red.

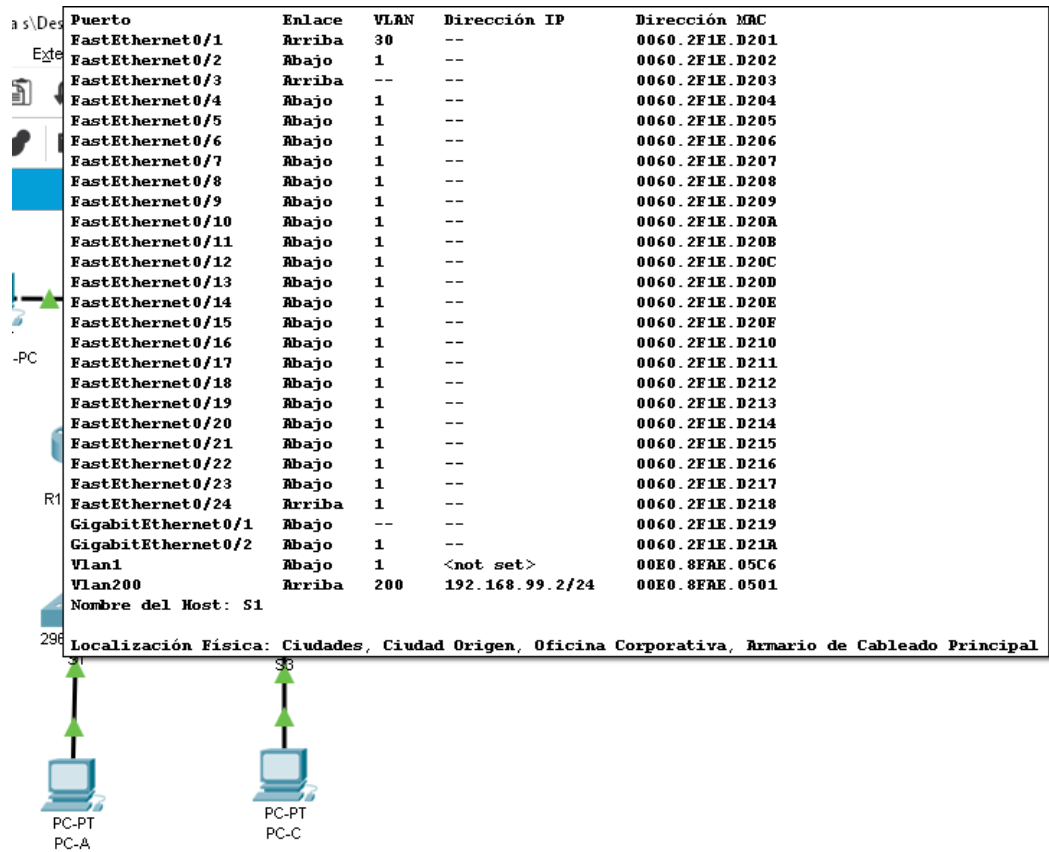


Ilustración 26: Desactivar interfaz pasivas

- Implement DHCP and NAT for IPv4
- Configurar R1 como servidor DHCP para las VLANs 30 y 40.
- Reservar las primeras 30 direcciones IP de las VLAN 30 y 40 para configuraciones estáticas.

Configurar DHCP pool para VLAN 30	Name: ADMINISTRACION DNS-Server: 10.10.10.11 Domain-Name: ccna-unad.com Establecer default gateway.
-----------------------------------	--

Configurar DHCP pool para VLAN 40	Name: MERCADEO DNS-Server: 10.10.10.11 Domain-Name: ccna-unad.com Establecer default gateway.
-----------------------------------	--

R1

R1_Bogota>enable

R1_Bogota#conf t

Enter configuration commands, one per line. End with CNTL/Z.

R1_Bogota(config)#ip dhcp excluded-address 192.168.30.1 192.168.30.30

R1_Bogota(config)#ip dhcp excluded-address 192.168.40.1 192.168.40.30

R1_Bogota(config)#ip dhcp pool Administracion

R1_Bogota(dhcp-config)#dns-server 10.10.10.11

R1_Bogota(dhcp-config)#domain-name ccna-unad.edu.co

R1_Bogota(dhcp-config)#default-router 192.168.30.1

R1_Bogota(dhcp-config)#network 192.168.30.0 255.255.255.0

R1_Bogota(dhcp-config)#dns-server 10.10.10.11

R1_Bogota(dhcp-config)#default-router 192.168.40.1

R1_Bogota(dhcp-config)#network 192.168.40.0 255.255.255.0

R1_Bogota(dhcp-config)#end

10. Configurar NAT en R2 para permitir que los hosts puedan salir a internet

R2_MIAMI>enable

R2_MIAMI#conf t

Enter configuration commands, one per line. End with CNTL/Z.

R2_MIAMI(config)#ip nat inside source static 10.10.10.10 209.165.200.209

R2_MIAMI(config)#exit

11. Configurar al menos dos listas de acceso de tipo estándar a su criterio en para restringir o permitir tráfico desde R1 o R3 hacia R2.

```
R2_MIAMl#conf t
```

Enter configuration commands, one per line. End with CNTL/Z.

```
R2_MIAMl(config)#access-list 1 permit 192.168.30.0 0.0.0.255
```

```
R2_MIAMl(config)#access-list 1 permit 192.168.40.0 0.0.0.255
```

```
R2_MIAMl(config)#access-list 1 permit 192.168.4.0 0.0.3.255
```

```
R2_MIAMl(config)#end
```

12. Configurar al menos dos listas de acceso de tipo extendido o nombradas a su criterio en para restringir o permitir tráfico desde R1 o R3 hacia R2.

```
R2_MIAMl#conf t
```

Enter configuration commands, one per line. End with CNTL/Z.

```
R2_MIAMl(config)#access-li
```

% Incomplete command.

```
R2_MIAMl(config)#access-list 101 permit tcp any host 209.165.200.229 eq www
```

```
R2_MIAMl(config)#int f0/0
```

```
R2_MIAMl(config-if)#ip access-group 101 in
```

```
R2_MIAMl(config-if)#int s0/0/0
```

```
R2_MIAMl(config-if)##ip access-group 101 ou
```

```
R2_MIAMl(config-if)#ip access-group 101 ou
```

```
R2_MIAMl(config-if)#int s0/0/1
```

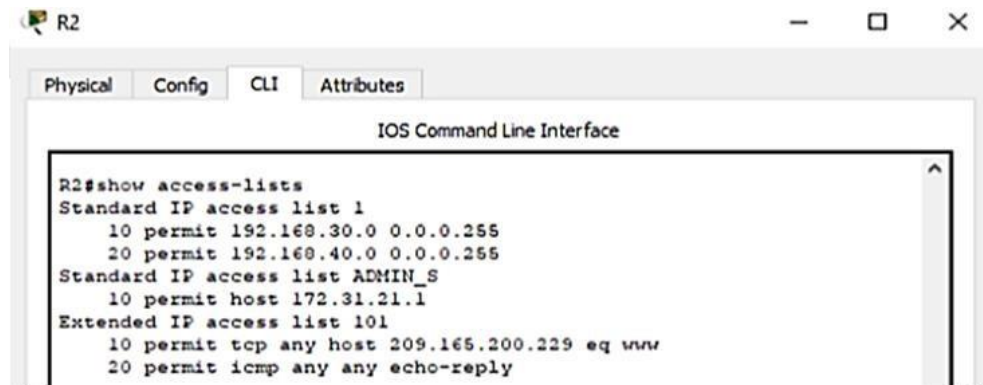
```
R2_MIAMl(config-if)#ip access-group 101 out
```

```
R2_MIAMl(config-if)#end
```

```
R2_MIAMl#
```

```
%SYS-5-CONFIG_I: Configured from console by console
```

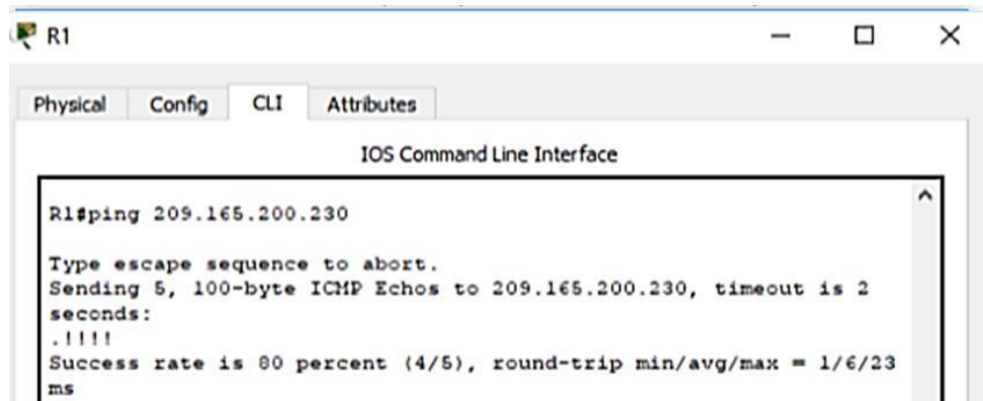

13. Verificar procesos de comunicación y re direccionamiento de tráfico en los routers mediante el uso de Ping y Traceroute.



The screenshot shows the CLI of router R2. The 'CLI' tab is selected. The command 'show access-lists' has been entered, displaying the following output:

```
R2#show access-lists
Standard IP access list 1
 10 permit 192.168.30.0 0.0.0.255
 20 permit 192.168.40.0 0.0.0.255
Standard IP access list ADMIN_S
 10 permit host 172.31.21.1
Extended IP access list 101
 10 permit tcp any host 209.165.200.229 eq www
 20 permit icmp any any echo-reply
```

Ilustración 27: Verificación



The screenshot shows the CLI of router R1. The 'CLI' tab is selected. The command 'ping 209.165.200.230' has been entered, displaying the following output:

```
R1#ping 209.165.200.230

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 209.165.200.230, timeout is 2
seconds:
.!!!!
Success rate is 80 percent (4/5), round-trip min/avg/max = 1/6/23
ms
```

Ilustración 28: Ping de R1 a 209.165.200.230

5 CONCLUSIONES

- Con el anterior trabajo se pudo dar solución a la problemática de los escenarios propuestos, pudiendo así poner en práctica el conocimiento adquirido a lo largo del diplomado como el protocolo DHCP, que nos permite asignar direcciones IP, muy útil para redes grandes.
- Para el escenario 1 se realizó configuración de enrutamiento para cada uno de los dispositivos mediante el protocolo RIP, aplicando los conocimientos adquiridos respecto a configuraciones PPP.
- Para el escenario 2, mediante configuración de direccionamiento ip, se configuro cada uno de los dispositivos de la topología, mediante protocolo OSPF V2 y los diferentes servicios como DHCP, PP, NAT y redes VLAN, después de la respectiva configuración se verifican mediante los respectivos comandos de conectividad y traceroute, evidenciando así la funcionalidad de las topologías configuradas

6 ANEXOS

1. Anexo 01. Escenario 1.pkt
2. Anexo 01. Escenario 2.pkt

7 BIBLIOGRAFÍAS

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